

HITCHCOCK'S *Machine Tool* **BLUE BOOK**

FOUNDED

DECEMBER 1940

1905



Performance established
leadership for this High Speed

MARVEL

Saws

MARVEL No. 8 . . . it does all things well

The busiest tool in the tool rooms, an essential tool in the complete die shop and a time and money saver in the maintenance department, because "it does all things well". The MARVEL No. 8 Metal Cutting Band Saw (capacity 18"x18") is the most universal saw built. It will snip off a $\frac{1}{8}$ " drill rod, rough out the largest billet or cut a perfect 45° mitre on the end of a large I-beam without any special setting-up. Its continuous blade feeds into the work at any angle from 45° right to 45° left. It has a large, removable vise and a combination hand and power feed.

Write for Bulletin 800A



Holding Fixtures



Mitering



Roughing Out



Double Angles



Squaring Rounds



Matched angles
without waste



Indexing



Mitering-Coping



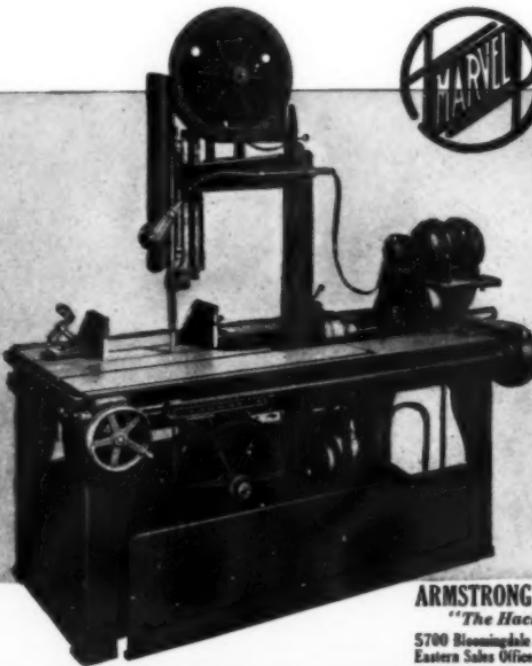
Odd Pieces



Die Shanks



Splitting Rings



ARMSTRONG-BLUM MFG. CO.

"The Hack Saw People"

5700 Bloomingdale Ave., Chicago, U. S.
Eastern Sales Office: 199 Lafayette St., N.



*"It's a
"MUST"
... to help you get
PROMPT DELIVERIES
LOWER COSTS.*

It's costly to experiment with inadequate arc welding equipment when rush delivery dates are to be met! Hobart Arc Welders, with the Multi-Range time and labor saving convenience features, are made to meet just such emergencies. They reduce labor costs; make it easier to get quality welds; operate profitably day after day without difficulty.

LIBERAL TRIAL In order to fully realize the savings you get with a Hobart, take advantage of our liberal trial plan that lets you use a Hobart on your own work, at our risk! Check coupon below.

HOBART BROS. CO., Box TB-1240, Troy, Ohio

"Successful Manufacturers Since 1892"

HOBART

"The Fastest Selling Arc Welder on the Market"

Free!

To get this valuable booklet, simply tear off coupon and mail today!

HOBART ELECTRODES—the equal of or better than anything you've tried for tank, boiler, shipbuilding, pipe, machinery, construction welding, etc. Get acquainted with them—ask for handbook and prices.

HOBART BROS. CO., Box TB-1240, Troy, Ohio

Please send me the welding book and more information on Hobart "Simplified" Arc Welding, especially on the items checked below:

Electric Drive A. C. Welder Hobart Electrodes

Gasoline Drive Liberal Trial Hobart Welding School

I'm interested in _____ amp. capacity arc welders.

NAME _____

ADDRESS _____

Spring tempered COLLETS



Order From Stock

Scientifically heat treated to a true spring temper, "Rivett Mark" collets resist wear and hold their spring longer than collets of any other make. As standard equipment on all makes of lathes and millers, (see Rivett Bulletin 100B) they may be ordered for immediate delivery from the following stocks:

CHICAGO

R. E. Ellis Engineering Co.
565 W. Washington Blvd.

DETROIT

Charles A. Strelinger Co.
149 E. Lerned Street

BOSTON

Rivett Lathe & Grinder Inc.
18 Riverview Road, Brighton

RIVETT

LATHE & GRINDER INC.

BRIGHTON, BOSTON, MASS.

HARDINGE

COLLETS SINCE 1890

DRAW-IN COLLETS FOR ALL LATHES AND MILLERS



Always specify HARDINGE collets—the name HARDINGE on a collet is an accuracy and durability guarantee.

When ordering lathes or millers of any make or size, specify HARDINGE collets, they cost no more than other collets.

You should have our No. 40 Collet Bulletin which lists and prices your collet requirements for your lathes and millers—Ask for your copy.

HARDINGE BROTHERS, Inc., ELMIRA, N. Y.

NEW YORK

CHICAGO

HARTFORD

PHILADELPHIA

CLEVELAND

Detroit

1890

HARDINGE GOLDEN ANNIVERSARY YEAR

1940



ARMSTRONG Wrenches



Contract now for next year's wrenches

The superiority of ARMSTRONG Wrenches begins in a full knowledge of wrench requirements resulting in: Improved design, special steel, heat treated to the correct degrees of hardness and tensile strength; in accurately milled openings, better finish and the balance that marks a fine tool.

Over 100 types, each in all sizes, exactly the kind and size wrenches you need and each at its best.

ARMSTRONG BROS. TOOL CO.

"The Tool Holder People"

308 N. Francisco Ave., Chicago, U. S. A.
Eastern Warehouse & Sales: 199 Lafayette St., New York

HITCHCOCK'S MACHINE TOOL BLUE BOOK

OVER 30,000 THIS ISSUE

DECEMBER 1940

VOLUME 35, No. 12

**THIS MONTH**

Lighting for Defense Work	23
By Dean M. Warren	
"Light" Tools In Industry	37
By Geo. A. Fairman	
Cutting Tool Essentials	49
By Leo J. St. Clair	
Recent Developments in Balancing Machines—Part (II)	
By Werner I. Senger	61
Lubricating the Modern Machine Tool—(Part II)	
By A. F. Brewer	79
Welding Design—(Part II)	
By R. A. Gast	93
New Trends and Developments	109
The Editor's Page	21
What's New in The Industry	125
Shop Notes	99
Mechanics Through the Ages	196
Latest Equipment Catalog	201-202
Buyers' Service	218
Index to Advertisers	240-243

Application for entry at Chicago, Ill. pending under Sec. 574½, P. L. & R.

Published Monthly by Hitchcock Publishing Company . . . 508 South Dearborn Street . . . Chicago, Illinois, U.S.A. . . . Geo. O. McKibben, President . . . J. E. Hitchcock, Vice President . . . Robert C. VanKampen, Business Manager . . . Wesley G. Paulson, Editor . . . M. L. Yonts, Production Manager . . . Richard J. Ferncase, Advertising Manager . . . Frank D. Dietz, Art Director . . . D. C. Funk, Circulation Manager.

REPRESENTATIVES: New England—Warren E. Hoffman, P. O. Box 15, Portland, Conn. . . . New York City—A. E. Wailes, 55 West 42nd Street, . . . Mid-Western, Dudley B. Trott, 12227 Clifton Blvd., Cleveland, Phone: Blvd. 8844 . . . West Coast—Robert H. Deibler, 2461 Sleepy Hollow Drive, Glendale, California, Phone: Chapman 5-3300.

(Copyright 1940, by Hitchcock Publishing Co., Chicago, Ill.)

Phones: Harrison 6040-1-2

Cable Address: HITCHPUB

BREAK THAT BOTTLE NECK in your tool room with a



Write for details and quotation.

40-H INDEX

at one third the cost
you have in mind.

IT MILLS slots, keyways, cavities, irregular curves with end mills $\frac{1}{8}$ " to $\frac{3}{4}$ " diameter in tool steel.

IT DRILLS to accurate locations without layout.

IT BORES up to 3" holes in steel—vertical, horizontal or at angles.

HAS VERNIERS for locating 8"x16" at one setting.

The fact that we are constantly receiving repeat orders from users is proof of our machine's performance.

Blank & Buxton Machinery Co.
3100 E. Michigan Avenue, Jackson, Michigan

*Step up production
ALL ALONG THE LINE
with
Hanna
Cylinders*

STANDARD MODELS
for SPECIAL JOBS!



Left: Hanna Hydraulic Cylinder Model H. P. 17, one of ten standard models built to accommodate practically every type of mounting requirement.

Right: Hanna Model 18 Low Pressure Cylinder, designed to operate with air, oil, or water, at pressures up to 100 lbs. per sq. in. This model is equipped with a flat base for rigid mounting.



Above: Hanna Hydraulic Cylinder Model H. P. 14, arranged for pivot-mounting, permitting cylinder to swing in an arc.

Below: Hanna Model 4 Air Cylinder with mounting for horizontal or vertical power movement.

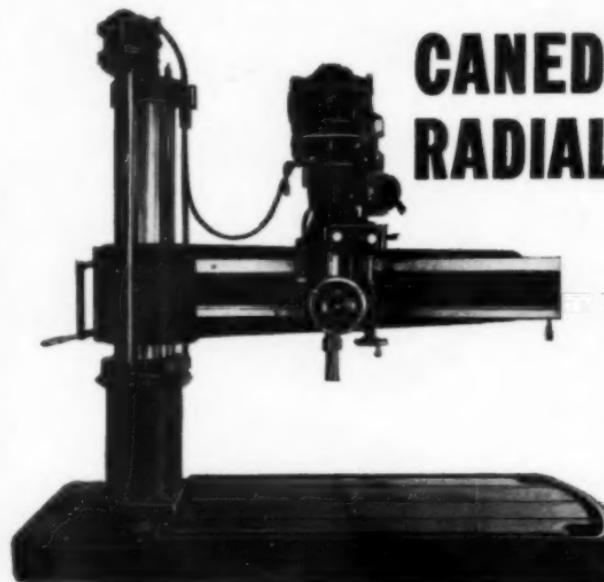


If YOUR present production schedule calls for increased speed, more work per man, and greater efficiency from existing machinery, then put Hanna Cylinders on the job right now! Let these efficient units do the hundreds of jobs that now require sheer physical effort or that now depend upon obsolete methods. There is a complete line of standard Hanna Cylinder models ready to handle special jobs that call for pushing — pulling — raising or lowering, faster and more economically.

We are equipped to meet your cylinder requirements promptly. Hanna Cylinder Catalogs, No. 229 Hydraulic and No. 228 Pneumatic, give complete details. Send for them today.

HANNA ENGINEERING WORKS
1772 ELSTON AVENUE • CHICAGO, ILLINOIS

Air and Hydraulic RIVETERS CYLINDERS
AIR AND HYDRAULIC AIR HOISTS

THE LATEST**CANEDY-OTTO
RADIAL DRILL**

We invite you to send for complete information regarding these and our many other models of drills and radial drills. For years, Canedy - Otto has been the manufacturer of first-class, high grade drilling units. Single spindle, multiple spindle, and radial drills. We can help you solve your production problems. Do not delay. Write today.

SPECIFICATIONS:

Drills to the center of circular on base or table

Length of arm

Greatest distance from spindle to base

Minimum distance from spindle to base

Minimum distance from spindle to column

Traverse of spindle

Hole in spindle—Morse Taper

Diameter of spindle at nose

Traverse of head on arm

Traverse of arm on column

Spindle speeds with 1200 RPM motor

Spindle speeds with 1800 RPM motor

Feeds per revolution of spindle

Bearing of arm on column

Size of main driving motor

Height of drill column over gears

Working Surface of base

Net weight

11" Column—5' Arm 11" Column 4' Arm

120"	96"	
5'	4"	
48"	48"	
15"	15"	
10"	10"	
9 1/2"	9 1/2"	
No. 4	No. 4	
2 1/2"	2 1/2"	
5 1/2"	3 1/2"	
22"	22"	
(60, 85, 130, 180, (425, 560, 860, (1200 RPM	(60, 85, 130, 180, (425, 560, 860, (1200 RPM	96"
(85, 130, 180, 274, (560, 860, 1160, (1750 RPM	(85, 130, 180, 274, (560, 860, 1160, (1750 RPM	48"
.004" .007" .010" .020"	.004" .007" .010" .020"	16"
18"	2 HP	2 HP
BB"	BB"	BB"
36 x 72"	29 1/2" x 51 1/2"	
7000 lbs.	6200 lbs.	

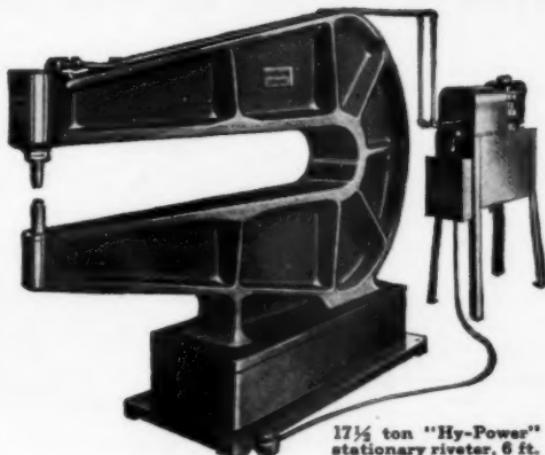
**CANEDY-OTTO MFG. CO.
CHICAGO HEIGHTS, ILLINOIS**

Riveting?

Hannifin "Hy-Power"
is the better, faster
method for production
riveting, punching, pressing,



17½ ton "Hy-Power" portable hydraulic riveter



17½ ton "Hy-Power" stationary riveter, 6 ft. reach. Portable model also available.

- Only Hannifin "Hy-Power" hydraulic equipment combines the high speed operation and ease of handling that means increased production with less work. Operators maintain high production rates with less fatigue, for "Hy-Power" hydraulic equipment is designed to minimize handling and effort.

The high speed operating cycle is push button controlled, and includes: 1. Rapid advance stroke; 2. Automatic high pressure working stroke; 3. Automatic reversal at peak pressure; 4. Rapid return stroke. The motor-driven "Hy-Power" pressure generator idles at zero pressure between cycles. Speeds range

from 1½ to 3 seconds for 3 to 4 inch stroke units.

Hannifin "Hy-Power" hydraulic units are built in portable and stationary types, capacities 2 tons to 50 tons and larger. Models are available for riveting, punching, pressing, press-assembly, stamping, forming, multiple punching and riveting, and similar work involving the application of pressure. Write for Bulletin S3-H giving complete information on all types.

HANNIFIN MANUFACTURING COMPANY
621-631 So. Kolmar Avenue • Chicago, Illinois

"*hy-power*"

HANNIFIN

MACHINERY
EQUIPMENT
MATERIALS

CUT EXPENSES with R and L Turning Tools

\$



\$

CUT EXPENSES by saving time. This Right and Left hand turning tool supplants more than a dozen different tools. Hours of set-up time are saved. R and L is capable of doing many different jobs at a single setting, such as drilling, turning and burnishing at the same time.

CUT EXPENSES by saving money. In first cost alone you save over \$200. You get this R and L turning tool at less than one fourth the cost of tools capable of doing the same jobs. And because R and L Tools are simple and ruggedly built, they retain their accu-

racy, thereby saving maintenance costs, and helping to cut production

Five sizes of R and L enable you to increase the efficiency and productiveness of your lathes and screw machines on a wide variety of work.

Inquire about our Tap and Die Holder, Roller Backrest, and Universal Tool Post. All of these tools are noted for their economy and efficiency.

Let us send you our newest booklet describing the money-saving line of R and L Tools.

**R and L Tools, 1825 Bristol St.,
Nicetown, Philadelphia, Pa.**

Full Speed Ahead with **TORQ DRIVES**



"Full Speed Ahead" is the command of the nation. Plants are taxed to capacity. The Defense Program and general uptrend in business, demand the utmost from machinery. Production must be increased in every possible way.

Torq Drives installed on your machine tools help to solve this problem. These units offer increased efficiency and flexibility with a marked reduction in operating costs. Your machines become a profitable investment and the tempo of your production is stepped up as much as 25%, and in some cases more.

Why not take full advantage of the production opportunities afforded by these drives and cash in on potential profits?

Write for full details on our drives today.

THE **TORQ** ELECTRIC MFG. COMPANY

Meeting Today's Cry for Faster DRILLING



Above: New Buffalo "RPMster" Variable Speed Drill; two sizes; Pedestal type only; one to six spindles.

Center: Buffalo Motor Spindle Drill; two sizes; Pedestal models only; one to six spindles.

Right: Buffalo Six Spindle No. 16 Power Feed Drill. Sturdy construction plus convenient operation, plus accuracy make No. 16 Drills favorites in many shops.

Buffalo Drills are "tailor-made" for today's stepped-up production schedules. Fast, dependable, fool-proof in operation, these modern drilling machines end many a shop bottle-neck, and actually pay for themselves in a short period thanks to the unvarying accuracy of every drilled hole and the increased speed of output on jobs big or little.

The new Buffalo "RPMster" Variable Speed Drill and the Buffalo Motor Spindle Drills shown below typify the Buffalo line of swift, easy-to-operate, precision drilling machines—all ruggedly built to the highest machine tool standards.

The complete line of Buffalo Drills includes models from the 14 in. to the 25 in. Heavy Duty drilling machine. Better send today for Catalog D-37 and see what Buffalo Drills can do for your shop!

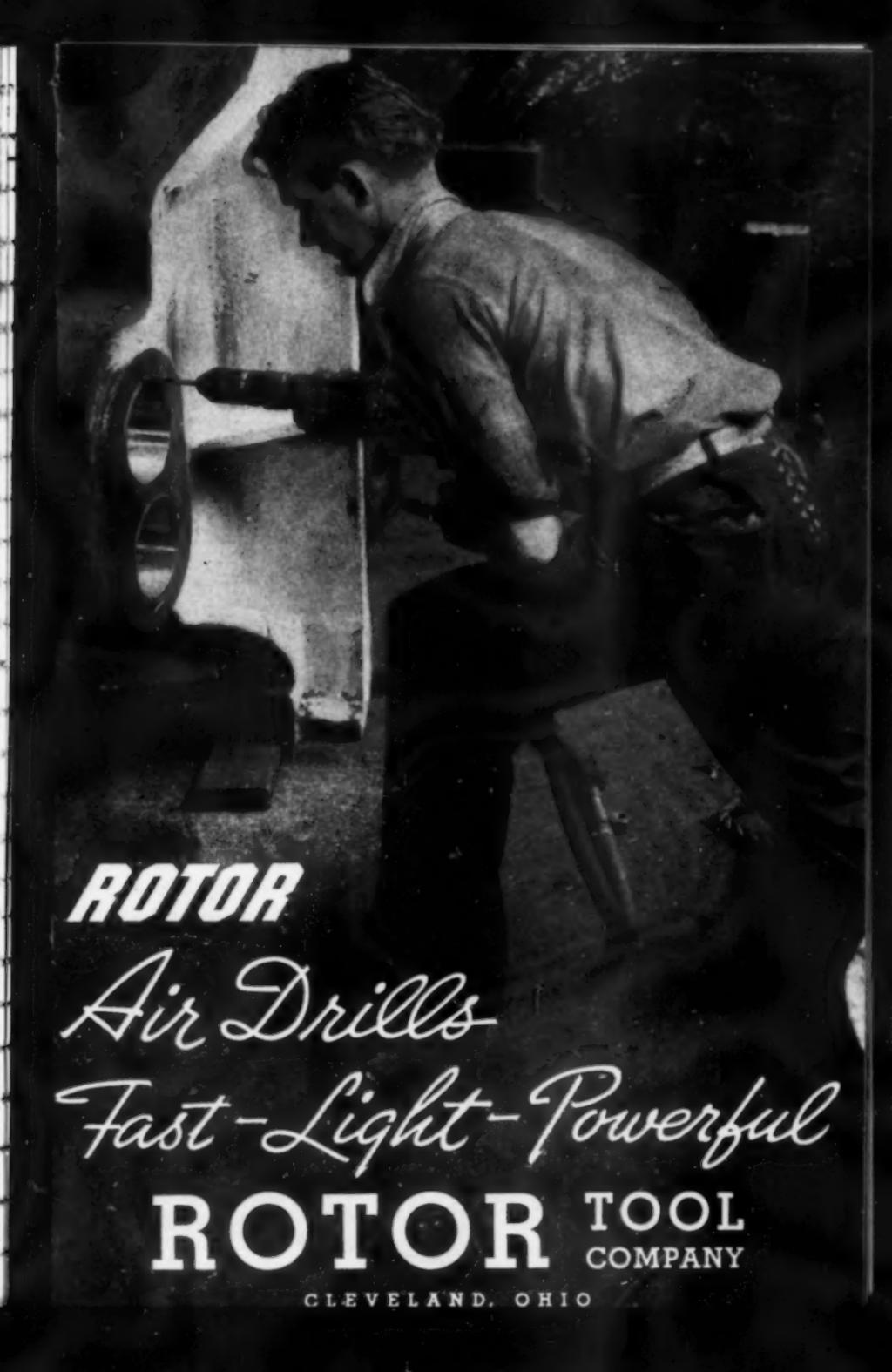


BUFFALO FORGE COMPANY
161 Mortimer St., Buffalo, New York

Canadian Blower & Forge Co.,
Ltd., Kitchener, Ont.



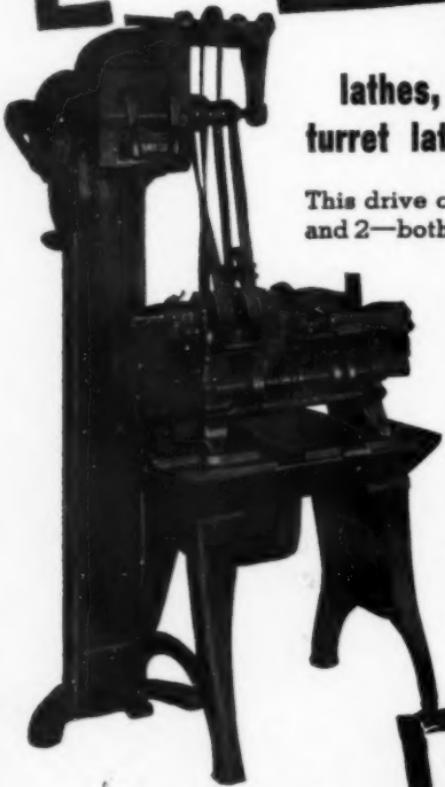
"Buffalo"
**DRILLING
MACHINES**



ROTOR
Air Drills
Fast - Light - Powerful
ROTOR TOOL
COMPANY
CLEVELAND, OHIO

TURNER GEAR BOX DRIVE

for Brown and Sharpe
AUTOMATIC SCREW MACHINES



PATENTS PENDING

THE TURNER UNI-DRIVE CO.
1638 CENTRAL STREET
KANSAS CITY, MISSOURI

Also Built for
lathes, shapers, radial drills,
turret lathes, vertical mills, etc.

This drive can be furnished for sizes 00, 0 and 2—both standard and high-speed types (six sizes in all.) Very compact, quiet and efficient individual drive. Six speed silent sliding gear transmission built especially for Brown & Sharpe Screw Machines. Quick change of pulleys gives unlimited speed range. Anti-friction bearings throughout. All steel, heat-treated gears running in oil. Can be installed without drilling in one hour.

DEALERS: Write for
prices and literature!
USERS: See your deal-
er or write for full facts!
PATENTS PENDING

Belted-Avey

DRILLING
and
TAPPING
MACHINES

The value of a tool not only depends upon the amount of work it will produce but upon the quality as well.

Avey products include a wide variety of types and sizes in standard single and multiple spindle, general purpose machines.



If you have a difficult drilling or tapping problem, consult our Engineering Department. No obligation, of course.

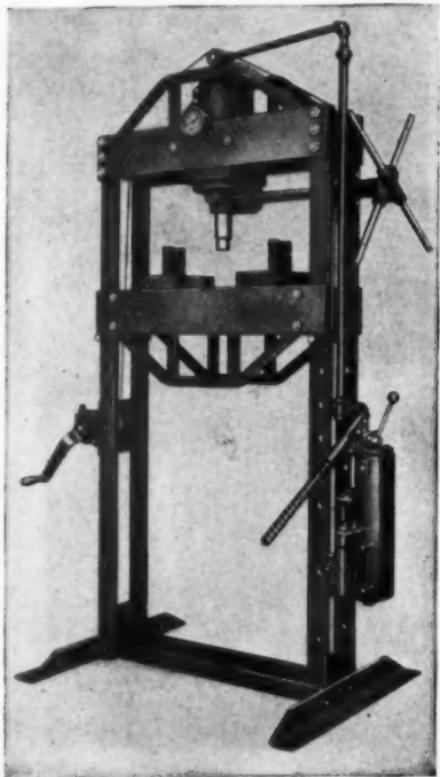
Avey for

QUALITY
ECONOMY
DEPENDABILITY

THE AVEY DRILLING MACHINE CO.
CINCINNATI, OHIO, U. S. A.

KRW HYDRAULIC ARBOR PRESSES

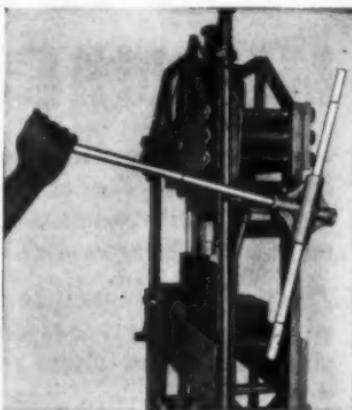
HAVE SPEED AND POWER FOR INDUSTRIAL USE



Every KRW Hydraulic Press is equipped with a built-in, mechanical press, operated by the pivoted cross arms shown below. These cross arms consist of 2 sliding handles either of which can be extended to increase the leverage.

Handles are circumferentially grooved to lock in 2 positions. This mechanical press has a maximum capacity of 3 tons.

The pivoted cross arms are also used to bring the ram to and from the work when the press is operated hydraulically. The downward motion of the ram fills the hydraulic cylinder with oil, so that the first stroke of the pump handle produces tons of hydraulic pressure.



View showing extensible cross arms for greater leverage. Note grooves which quickly locate arms in extended or central position.

K. R. WILSON

27 Lock Street, Buffalo, N. Y., U. S. A.

Export Department

90 West St., New York, N. Y.

West Coast Branch

722 Mateo St., Los Angeles

RUGGED



Chicago Steel Forming Press

This No. 253 is a Rugged All Steel—Powerful—Inexpensive Press Brake, designed and built to the standards of Chicago Steel Forming Presses.

A money-saving production tool that will handle 40 to 50 percent of the work done in the average shop. You can count on greater speed — higher efficiency — much lower operating cost—plus the same high quality material and sturdy welded construction as in our larger machines.

Standard Series—3 sizes—capacities 14 ga. 4 ft. long; 16 gage 5 ft. long; 18 gage 6 ft. long.

Heavy Duty Series—3 sizes—capacities 10 gage 4 ft. long, V die; 12 gage 5 ft. long; 14 ga. 6 ft. long.

Priced at less than half the cost of other machines of similar capacity. Powered by 3/4 to 1½ h. p. motors. Furnished with variable speed drive if desired. **Write for all catalogs on our presses.**

WYCO

**MODEL 1A
FLOOR TYPE**

WYCO

**1/2-H. P.
3450
R. P. M.**

**INCLUDING
7-ACCESSORIES
SHOWN**

PRICE \$45

**MODEL FLOOR TYPE
2A**

WYCO

**1/2-H. P.
3450
R. P. M.**

**PRICE
\$60**

**COMPLETE
AS SHOWN**

WYCO HEAVY DUTY MODEL 43-T

WYCO

**FOR
PRODUCTION
WORK**

**1-H. P.
1800—
3600—
6000—
R. P. M.**

PRICE, AS SHOWN - \$175

WYCO

**1/2-H. P.
1800-3600
7200
R. P. M.**

PRICE, COMPLETE, \$85

WYCO

**MODEL
20-BH
TOOL
ROOM
GRINDER**



FLEXIBLE SHAFTS



with Wyco Patented Non-Metallic Inner Liner have longer core-life, smoother, cooler running, more efficient power transmission—The WYCO cushioning, non-metallic inner liner is the greatest advance in Flexible Shaft construction since the invention of the wire wound core. WYCO Flexible Shafts are made in all sizes to fit directly to any motor shaft.

WYCO MACHINES FIT ALL INDUSTRIES

For Sanding — Grinding — Polishing — Wire Brushing — Drilling — Sawing — Hammering — Vibrating, etc.

WYCO FLEXIBLE SHAFT MACHINES

are designed for modern production methods in Automotive and Aviation Shops, Foundries, Welding Shops, Toolroom and Pattern Shops. Also for Stone and Concrete Grinding, Glass Grinding and for Internal Concrete Vibration.

WYCO DISTRIBUTORS COVER THE FIELD

*Write for our New 28 page Catalog
Sent FREE - No obligation*

WYZENBEEK & STAFF, Inc.

838 WEST HUBBARD ST.,

CHICAGO

REDUCE POWER COSTS

Flexoid 8 Speed Control Units



Flexoid Speed Control Units solve the problem of converting every type and size of line shaft driven machine to modern, individual motor drives for more efficient and economical production.

This New Flexoid 8 Speed Control Unit is an addition to the regular line of 4 Speed Control Units. A patented double cam construction enables all 8 ratios to be controlled through a single hand wheel with neutral positions between changes. Handwheel may be mounted at either end of unit, or remote control used.

The housing is heavy cast iron; shafts and gears alloy hardened steel. One piece shafts are solidly mounted in SKF Ball Bearings. No pilot bearings or bronze bushings. Gears and bearings operate in oil bath. Input and output shafts may be direct connected or driven by V-belt, flat belt or chain.

Write for new folder describing our power unit drives

The Smith Power Transmission Co.
1545 E. 23rd St., :::: Cleveland, Ohio

Today You Need SPEED



IN YOUR SHOP EQUIPMENT

NOW, more than ever, you need shop machinery that will produce more in less time. High spindle speeds are essential for the efficient use of modern sintered carbide and diamond cutting tools. Smooth vibration-free operation at high speed is achieved by South Bend Lathes by using a direct belt drive to the spindle, a precision balanced spindle assembly and spindle bearing surfaces that are hardened, ground and superfinished to a smoothness of five millionths (.000005").

At right—10" Swing, 1" Collet Capacity South Bend Tool Room Precision Bench Lathe. This lathe has nine spindle speeds ranging from 50 to 1357 R.P.M., 1½" hole through spindle, 1" maximum collet capacity, 48 power longitudinal carriage feeds, 48 power cross feeds, and cuts 48 different pitches of screw threads.

SIZES OF SOUTH BEND LATHES

Swing	Bed Lengths	Center Distances
9"	3' to 4½"	16" to 34"
10"	3' to 4½"	15½" to 33¾"
13"	4' to 7"	16" to 52"
14½"	5' to 10"	24½" to 84½"
16"	6' to 12"	33½" to 105½"

PARTIAL LIST OF DEALERS

See a South Bend Lathe before you buy. Write today for free catalog and name of nearest dealer.

Baltimore, Md.—Cecry Mach. & Supply Co.
Boston, Mass.—South Bend Lathe Works*
Bridgeport, Conn.—A. C. Bisgood
Buffalo, N.Y.—E. C. Neal Company, Inc.
Chicago, Ill.—South Bend Lathe Works
Cincinnati, Ohio—C. H. Grainger Mach. Co.
Detroit, Mich.—Lee Machinery Company
Los Angeles, Cal.—Eccles & Davison Mach.
Milwaukee, Wis.—W. A. Voell Mach. Co.
Newark, N.J.—J. E. Edwards Mach. Co.

Boston Sales Office: 67 Broadway, Kendall Sq.
Chicago Sales Office: Room 308, Machinery Sales Building, Telephone State 7263



SOUTH BEND LATHE WORKS Lathe Builders Since

195 E. Madison Street, South Bend, Indiana, U. S. A.

The Editor's Page

What "bottleneck"?

Frequently the machine tool industry has been called the "bottleneck" in our defense program.

Yet the record shows that this "bottleneck" is now skimming along at the record rate of 230 per cent of the 1929 production level. Daily, weekly and monthly this vital industry has been attaining new all-time production peaks.

All of this reflects the energy, resourcefulness and loyalty of the machine tool builders and it has elicited praise from Mr. Knudsen.

It is the more noteworthy considering that in 1932, at the bottom of the depression, machine tool volume dropped to a mere \$22,500,000—or about one-twentieth of the present output.

In round numbers, the industry includes some 250 companies, with a total investment of about \$150,000,000. In ordinary times, the annual business has averaged around \$100,000,000 and afforded employment for about 50,000 men.

The efficient and wholehearted manner in which the industry has responded to our defense needs has set a shining example. If other industries approach this performance there should be no delays in our armament program.

All of this has been done without government funds. The tool industry has expanded to the point where it will be in position to turn out more than a half billion dollars' worth of the world's finest production tools during 1941.

We can well be proud of our machine tool industry. Nowhere else in the world is there a comparable industry—in production capacity or in quality and versatility of products.

Wesley G. Paulson

THE RYERSON UNIQUE

3 point program

EVERYTHING IN STEEL

1 Ryerson carries the largest and most complete steel stocks in America . . . carbon steels, alloys, stainless, etc., in every size, shape and form . . . a ready, reliable source of supply.

CERTIFIED QUALITY

2 Ryerson Certified Uniform High Quality Steels meet exacting, narrow range specifications . . . an important advantage, especially with alloy steels, where chemical content, heat-treating response and other characteristics must be known with certainty to assure best results in less time.

IMMEDIATE SHIPMENT

3 Fast delivery is assured from all ten conveniently located Ryerson plants . . . no order too small for personal, attention or too large for immediate shipment.

PRODUCTS INCLUDE:

- Structurals
- Bars
- Plates (15 kinds)
- Sheets (25 kinds)
- Strip Steel
- Alloy & Tool Steels
- Stainless
- Shafting
- Mech. Tubing
- Boiler Tubes
- Welding Rod
- Babbitt, Solder
- Reinforcing
- Nails, Rivets, etc.

RYERSON *Certified* STEELS

Joseph T. Ryerson & Son, Inc. Plants at: Chicago,
Milwaukee, St. Louis, Cincinnati, Detroit, Buffalo,
Cleveland, Boston, Philadelphia, Jersey City.



Lighting for Defense Work

By DEAN M. WARREN

THE Defense Program is making demands on industry that require the utilization of every known aid to improve efficiency. Good lighting can help industry to meet the production problems of the present. It proved itself an indispensable production tool during the last World War and it should be of even greater assistance today because the illuminating engineer is better equipped to specify the quantity and quality of lighting required for a given eye task, than at any time in the past. Furthermore, practically all the present recommended lighting equipment has been developed since the last war and today's sources, particularly the Mazda F fluorescent lamps, are now competitors of daylight. And on the cost side, ten times as much light can be purchased today for the same amount as in 1913, which means that if management only spends as

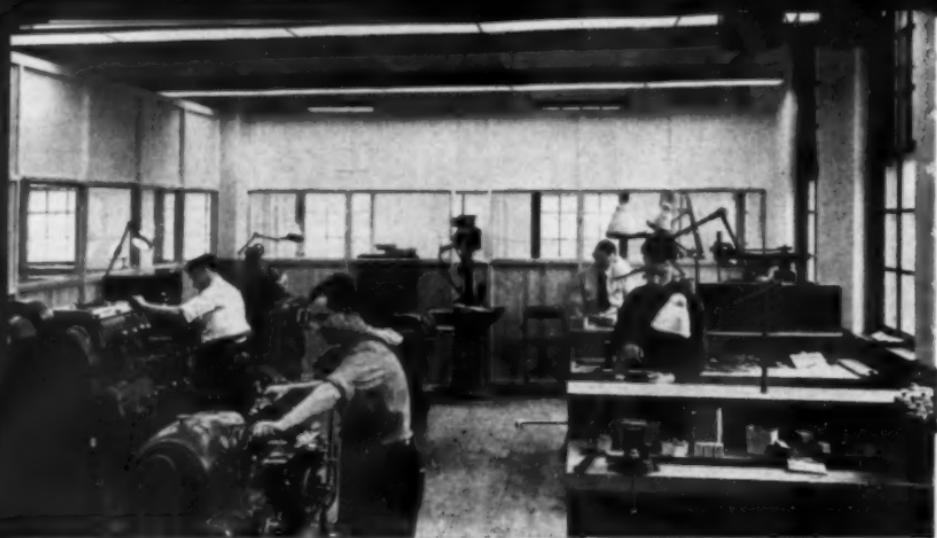
much for lighting today as during the first World War, they will have excellently lighted plants.

Quality of Lighting

In designing a lighting system, the most important factor to be considered is the quality of the lighting. This concerns the distribution of brightness in the field of vision. In a broad sense, the efficiency of a lighting system is to be judged by the seeing ability which is obtained for a given expenditure, not simply by evaluating the foot-candles which are obtained from a given number of watts per square foot.

First consider the matter of distribution—that is, the way the light is distributed throughout the work area. In general, it is desirable to have fairly uniform general illumination throughout the work area, since where the lighting is very uneven, with extreme contrast between bright and dim areas,





Forty-five footcandles of Mazda F general lighting, supplemented by filament lighting of 100 or more footcandles enable these machinists to see detail with ease.

eyestrain generally results. Seeing is then difficult, because unconsciously, the worker's eyes are continually trying to adapt themselves to the many lighting conditions in the field of view.

Uniform illumination is desirable also from the standpoint of maximum availability of floor space. Machines and benches then can be re-arranged for the most efficient plant operation without wondering "whether there is enough light for the job over in that corner."

In considering the matter of distribution to obtain good seeing conditions in manufacturing areas, two factors are of primary importance:

1. Direct lighting units should be spaced no farther apart than their heights above the floor.
2. Where local lighting is employed, general light should also be used. (This will be discussed more in detail in a succeeding article.)

The presence of harsh, dark shadows constitutes an accident hazard because they may obscure objects that should be seen. Shadows slow up production, are a contributing cause of accidents and are likely to cause errors in operation. Shadowy interiors hide dust and dirt, thereby affecting plant maintenance. Shadows can be avoided by a

consideration of the same factors that prevent poor distribution.

Glare is another quality factor which can handicap employee efficiency. There are two kinds—direct and reflected. Direct glare from a light source is the more common. It results from:

1. Lighting equipment which does not confine the light principally to angles well above or well below the horizontal, but directs an excessive amount to the eye.
2. Lighting units that are too bright because they are equipped with lamps which are too large for them.

Reflected glare is often more objectionable than direct glare and quite frequently more harmful, because it is generally from a direction below the horizontal, a zone in which the eye has no natural protection. It may be caused by:

1. The use of equipment that does not diffuse the light sufficiently to reduce its brightness when the reflected image is seen in the work.
2. Improper location of local lighting equipment which permits bright reflections of the source to reach the eye.

Quantity of Light

The most desirable quantity of light for a particular job depends on the intricacy of detail involved. If the machinist, for instance, is working to very close tolerances, then he requires all the help that adequate lighting can give him.

The well-designed installation can supply many more footcandles than are commonly found in industry today. However, the best lighting systems supply meager light compared to the illumination values outdoors, which range from 500 footcandles in the shade of a tree, to 8,000 to 9,000 footcandles in the bright summer sunlight.

Many installations supplying 25 to 50 footcandles of general lighting are now in use, some with local lighting of 100 to 300 footcandles. These have been found to be both profitable and practical since the benefits derived much more than offset the additional cost of operating such systems.

Recommendations are given here for a few of the tasks performed in the machine tool world. These may seem low when compared to outdoor values. However, they represent practical steps toward the much higher values, that are more nearly ideal.

using Task Recommended Footcandles

Inspection:	
Rough	10
Medium	20
Fine	50-100
Extra Fine	100 or more

Machining Shop:
Rough Bench and Machine Work 10

Medium Bench and Machine Work Ordinary Automatic Machines, Rough Grinding, Medium Buffing and Polishing 20

Fine Bench and Machine Work, Fine Automatic Machines, Medium Grinding, Fine Buffing and Polishing 50-100

Extra Fine Bench and Machine Work, Grinding—Fine Work 100 or more

For more detailed recommendations and technical discussions on various phases of industrial lighting, the reader is referred to the bulletins published by the Illuminating Engineering Society, 51 Madison Ave., New York City:

Recommended Practice of Industrial Lighting

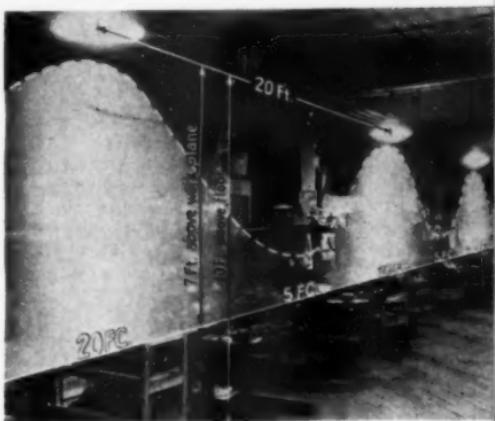
Report on Lighting of Power Presses

Report on Lighting For the Machining of Small Metal Parts

Report on Lighting For Intricate Production, Assembly and Inspection Processes



Daylight falls off rapidly indoors and workers are unfairly penalized because of machine location unless the general lighting is used at all times. This photo was taken on a bright June day.



Above is shown an illustration of how improper spacing results in "peak and valley" lighting.

Below is an example of proper spacing which assures reasonable uniformity, thus enabling every square foot of floor area to be utilized for work tasks.





This installation of 400-watt Mercury lamps provides 40-footcandles in this interior.

Lamps for Industrial Lighting

The Mazda F fluorescent lamps bring to industry the cool, white light which has been so long desired. Besides producing artificial daylight at the highest efficiency ever achieved in lamp manufacturing, the lamps have a number of characteristics that recommend them for industrial lighting. For example, they make it possible to provide 100 or more footcandles without the discomfort from heat, formerly associated with high illumination. This is possible because the lamps radiate only one-fourth as much heat per footcandle as filament lamps. This cool characteristic deserves emphasis because these sources can now be mounted close to the work without the workman complaining of heat.

The lamps are large area sources of relatively low brightness and hence, direct and reflected glare are controlled and cease to be a problem.

These sources are of the electric discharge type, that is, they operate as arc lamps. Briefly, they consist of a

pair of electrodes at either end of the glass tube. The tube is coated with a fluorescent powder, the composition depending on the color desired, and contains a small amount of mercury. When the current is turned on, an arc is produced which is rich in ultraviolet and this ultraviolet causes the powders to fluoresce and give off light.

Because the lamps are arc sources, they require some form of ballast for operating. These are available today for operating either one or two lamps, the latter being known as the "Tulamp" ballast. Both correct power factor to better than 90%.

The prevalence of 60-cycle alternating current makes this the national standard of utility electric service and ballasts are designed for this frequency, although special auxiliaries for 50-cycle operation may be obtained.

To correct the low power factor of some existing installations and single lamp units, there are available, compact capacitors for supplying the leading current. Today there is no reason

DATA ON FLUORESCENT LAMPS

	18"	24"	36"	48"	58" RF	60"
Nominal Lamp Watts	15	20	30	40	85	100
Circuit Voltages	110-125	110-125	(199-216)	(199-216)	(95-125)*	(199-216)
			(220-250)	(220-250)	(190-250)*	(220-250)
Diameter	1"	1½"	1"	1½"	1¼"	2-¼"
Rated Lab. Life Hrs.	2500	2500	2500	2500	3000	2000
Lumens — Daylight	495	760	1250	1800	—	—
Lumens — White	585	900	1450	2100	4000	4400
Lumens — Bluish White	—	—	—	—	4000	—

*Auxiliaries provided with tap changing switches to provide for prevailing voltages.



ALTER EGO: Literally "one's other self"—the still, small voice that questions, inspires and corrects our conscious action.

ALTER EGO: We have the ability to get faster welding and smoother, stronger welds. Stop imagining—even to yourself—that we haven't.

Well, the shop hasn't taken any prizes so far. At least our work isn't up to expectations.

ALTER EGO: Then the boys aren't getting that something which gives them mastership of their ability.

You've hit the words. Now to put

them to music. Let's find that something.

ALTER EGO: Maybe they need a welder that will add flexibility to ability. Why not get Lincoln's suggestion.

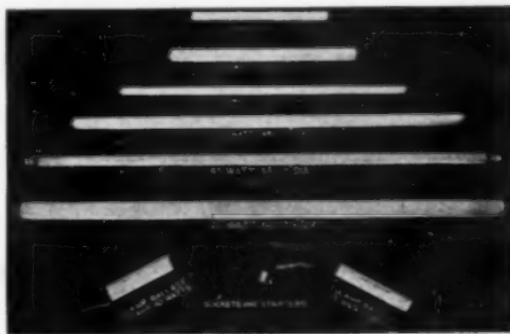
★ ★ ★

LINCOLN SUGGESTS: A full kit of tools is essential for mastership of any skilled workman's ability. In arc welding, the full benefit of the welder's skill is assured by "Shield-Arc's" Dual Continuous Control which allows independent adjustment of both the type of arc and its intensity for faster welding and better welds. How? See Page 6, Bulletin 412.

LINCOLN "SHIELD-ARC" WELDING THE LINCOLN ELECTRIC COMPANY
Cleveland, Ohio

Largest Manufacturers of Arc Welding Equipment in the World

Here is the present line of fluorescent lamps used in industrial lighting and some of the auxiliary equipment required for operation.



why anyone need not have high power factor and thus get the maximum from his wiring.

The question is generally asked:—"Can the lamps operate on direct current?" They can, but such operation usually results in decreased overall efficiency of light production, useful lamp life, light output and starting reliability. Present tests indicate that only 18" and 24" lamps should be used on direct current.

An accompanying table gives the essential data on the Mazda F lamps and the RF (rectified circuit) lamp.

Filament

These sources are available in sizes ranging from 15 to 1500 watts. They will operate in any position of burning, but the light output maintenance is best, particularly in the higher wattage sizes, when they are burned vertically, base up. General lighting service lamps may be obtained inside frosted, clear or with white or silvered bowl.

Clear-bulb lamps are satisfactory for use in adequately shielded equipment such as Glasssteel Diffusers or high bay equipment which protects the eyes from the irritating effects and inefficiencies of glare.

White bowl and Silvered bowl lamps are recommended for use in open type equipments, such as, the RLM Dome Reflector and Silvered Bowl Diffusers, to improve the quality of illumination by reducing direct glare, reflected glare and deep shadows.

Newest filament lamps are the projector spot and flood types. These

lamps combine within a sealed unit, all the elements necessary for the production of controlled light beams.

The spot lamp is being used in industry for providing a high level of lighting over a restricted area where critical seeing is being done. For example, mounted 5 ft. above the work area, it will produce approximately 400 footcandles and cover an area 20" in diameter. Mounted 10 ft. from the task, approximately 100 footcandles will be produced with the beam, covering an area 40" in diameter.

The flood lamp has a wider beam spread. It is being used for the protective lighting of industrial plants. Both the spot and flood lamps are made of hard glass and consequently can be used outdoors without protection.

Mercury

These lamps, available in 250 and 400-watt sizes, differ radically in principle from filament lamps both in their operation and in the color quality of the light produced. The principle of operation is that of a mercury vapor arc or flow of current between the two main electrodes, located at the upper and lower parts of the bulb. The operating characteristics of these lamps are such that they require special regulatory devices for their operation. These devices may be located at any place on the circuit so long as no other current than that of its respective lamps is drawn from it and the voltage drop between lamps and transformer does not exceed 2 volts.

These lamps may be employed singly



BRASS FILE



FOUNDRY FILE



DIE-CAST FILE

GEARED UP FOR ANY FILING REQUIREMENT

SPEED, accuracy and work-volume are the industrial watchwords of today. Metals and their alloyed offspring are manifold. Products and production methods present varying conditions.

The combinations of factors are so many and varied that it is not enough to know which type of tool or device to use, but what *special design in the tool* will lead to the best action or results in a given instance or on a particular job.

This is particularly true of files. Nicholson has found the multiplicity of filing problems big enough to command the exclusive study and attention of specialists.

Deep-rooted in this policy, Nicholson makes nothing else . . . lists more than 3000 kinds, sizes and cuts of files . . . has become the largest file manufacturer in the world . . . and, through well-equipped facilities for fast production, special orders, or consulting service, is *geared up for any filing requirement*.

NICHOLSON FILE CO., Providence, R. I., U. S. A.
(Also Canadian Plant, Port Hope, Ont.)

- TECHNICAL BULLETINS on Nicholson and Black Diamond Brass, Foundry, Die-cast, Aluminum "A," Stainless Steel, Long Angle Lathe, Shear-tooth, Lead Float, Aluminum Rasp, etc., are available through your mill-supply house or direct from us.

NICHOLSON

MADE IN U. S. A.

NICHOLSON FILES

FOR EVERY
PURPOSE

or combined with filament lamps in a single unit, usually on an equal wattage basis for industrial lighting. They are being widely used in the machine tool industries.

Equipment For General Lighting

Selecting the right kind of equipment for a given job is as important as selecting the right lamp for the job. There are seven fundamentals of performance usually observed by the experienced lighting engineer in the choice of types of units for industrial lighting, namely:—(1) Efficiency; (2) Light Distribution at Various Angles; (3) Ease of Maintenance; (4) Durability; (5) Absence of Direct or Reflected Glare; (6) Absence of Shadows; (7) Cost.

RLM Dome reflector is perhaps the most widely used of the industrial filament lamp equipments. It is the standardized product of a large group of manufacturers and it meets rigid requirements as to mechanical excellence and lighting efficiency. This type of equipment is also available for use with 2-40-watt Mazda F lamps and when installed in continuous rows, provides high quality lighting. The values provided are given in an accompanying table.

The Silvered Bowl and Glassteel Diffusers provide lighting of higher quality than the RLM filament lamp unit. The Silvered Bowl equipment consists of a porcelain-enamede steel reflector, equipped with a semi-dif-

ILLUMINATION VALUES CALCULATED for VARIOUS LAMP SIZES IN VARIOUS EQUIPMENT TYPES

Area Per Outlet Adequately Lighted — or Approx. Spacing 55-65 Sq. Ft. or 7-3/4'x7-3/4' 65-75 Sq. Ft. or 8-1/4'x8-1/2' 75-85 Sq. Ft. or 9'x9' 85-95 Sq. Ft. or 9-1/4'x9-1/2' 95-110 Sq. Ft. or 10'x10' 110-125 Sq. Ft. or 11'x11' 125-145 Sq. Ft. or 11 1/2'x11 1/2' 145-170 Sq. Ft. or 12 1/2'x12 1/2' 170-200 Sq. Ft. or 13 1/2'x13 1/2' 200-230 Sq. Ft. or 14 3/4'x14 3/4' 230-260 Sq. Ft. or 15 1/4'x15 1/2' (High Bay 15') Two lamps at each outlet	Distance from Underside of Reflector to Floor to be Not Less Than	Conditions Factor	Direct Lighting Equipment for Low Mounting Such As Glassteel & RLM Type Fixtures — Average Footcandles					Direct Lighting Fluorescent		
			200-Watt	300-Watt	500-Watt	750-Watt	400 Watt Merc. R.F. Lamp	85-Watt R.F. Lamp		
7' 6"	Average	14-18							24-30	
8' 6"	Average		17-24						21-26	
8' 6"	Average		17-21						18-23	
9' 0"	Average		15-21	27-35					32-40*	
9' 6"	Average		13-18	25-31	34-48				29-35*	
10' 0"	Average			20-27	30-40				25-31*	
10' 6"	Average				18-23	27-36				
11' 6"	Average				17-21	24-31	27-33			
11' 6"	Average				14-18	19-27	23-28			
12' 6"	Average				12-15	16-22	20-24			
13' 0"							15-19	17-22		

NOTE: These columns are calculated for Glassteel Diffusers; for RLM Dome Reflectors add 10% to obtain the approximate footcandle reading.

Mount units 12 ft. high wherever possible.



SAVE TIME on new developments by using **S. S. WHITE FLEXIBLE SHAFTS**



WHERE new developments include flexible shafts either for REMOTE CONTROL or for POWER TRANSMISSION, you can save time by using S. S. WHITE Flexible Shafts. Here's why Applications are so numerous in the aircraft, automotive, machine tool, radio, electrical and other industries that a wide variety of fully developed S. S. WHITE combinations consisting of shaft, casing and fittings is available. Chances are good that among these many combinations is one that will meet your particular requirements without modification.



PUT YOUR PROBLEMS UP TO US

Time may also be saved by referring your flexible shaft problems to our widely experienced engineers for recommendations. Their cooperation is yours without obligation.

SEND FOR THESE BULLETINS

BULLETIN 1238—Flexible Shafts for POWER DRIVES

BULLETIN 38—Flexible Shafts for REMOTE CONTROL

BULLETIN 839—Flexible Shaft Combinations for AIRCRAFT

S. S. WHITE

The S. S. White Dental Mfg. Co.

INDUSTRIAL DIVISION

Dept. H, 10 East 40th St., New York, N. Y.

FLEXIBLE SHAFTS for POWER DRIVES, REMOTE CONTROL and COUPLING

or combined with filament lamps in a single unit, usually on an equal wattage basis for industrial lighting. They are being widely used in the machine tool industries.

Equipment For General Lighting

Selecting the right kind of equipment for a given job is as important as selecting the right lamp for the job. There are seven fundamentals of performance usually observed by the experienced lighting engineer in the choice of types of units for industrial lighting, namely:—(1) Efficiency; (2) Light Distribution at Various Angles; (3) Ease of Maintenance; (4) Durability; (5) Absence of Direct or Reflected Glare; (6) Absence of Shadows; (7) Cost.

RLM Dome reflector is perhaps the most widely used of the industrial filament lamp equipments. It is the standardized product of a large group of manufacturers and it meets rigid requirements as to mechanical excellence and lighting efficiency. This type of equipment is also available for use with 2-40-watt Mazda F lamps and when installed in continuous rows, provides high quality lighting. The values provided are given in an accompanying table.

The Silvered Bowl and Glassteel Diffusers provide lighting of higher quality than the RLM filament lamp unit. The Silvered Bowl equipment consists of a porcelain-enamede steel reflector, equipped with a semi-dif-

ILLUMINATION VALUES CALCULATED for VARIOUS LAMP SIZES IN VARIOUS EQUIPMENT TYPES

Area Per Outlet Adequately Lighted — or Approx. Spacing 55-65 Sq. Ft. or 7-3/4"x7-3/4' 65-75 Sq. Ft. or 8-1/2"x8-1/2' 75-85 Sq. Ft. or 9"x9' 85-95 Sq. Ft. or 9-1/2"x9-1/2' 95-110 Sq. Ft. or 10"x10' 110-125 Sq. Ft. or 11"x11' 125-145 Sq. Ft. or 11-1/2"x11-1/2' 145-170 Sq. Ft. or 12-1/2"x12-1/2' 170-200 Sq. Ft. or 13-1/2"x13-1/2' 200-230 Sq. Ft. or 14-3/4"x14-3/4' 230-260 Sq. Ft. or 15-1/2"x15-1/2' (High Bay 15') Two lamps at each outlet	Distance from Underside of Reflector to Floor to be Not Less Than 7' 6" 8' 6" 8' 6" 9' 0" 9' 0" 9' 6" 10' 0" 10' 0" 10' 6" 11' 6" 11' 6" 11' 6" 11' 6" 12' 6" 13' 0"	Conditions Factor Average	Direct Lighting Equipment for Low Mounting Such As Glassteel & RLM Type Fixtures — Average Footcandles				Direct Lighting Fluorescent	
			200-Watt	300-Watt	500-Watt	750-Watt	400 Watt Merc.	85-Watt R.F. Lamp
7-3/4"x7-3/4'	7' 6"	Average	14-18					24-30
8-1/2"x8-1/2'	8' 6"	Average		17-24				21-26
9"x9'	8' 6"	Average			17-21			18-23
9-1/2"x9-1/2'	9' 0"	Average			15-21	27-35		32-40*
10"x10'	9' 6"	Average			13-18	25-31	34-48	29-35*
11"x11'	10' 0"	Average				20-27	30-40	25-31*
11-1/2"x11-1/2'	10' 6"	Average				18-23	27-36	
12-1/2"x12-1/2'	11' 6"	Average				17-21	24-31	27-33
13-1/2"x13-1/2'	11' 6"	Average				14-18	19-27	23-28
14-3/4"x14-3/4'	12' 6"	Average				12-15	16-22	20-24
15-1/2"x15-1/2'	13' 0"					15-19	17-22	

NOTE: These columns are calculated for Glassteel Diffusers; for RLM Dome Reflectors add 10% to obtain the approximate footcandle reading.

Mount units 12 ft. high wherever possible.

SAVE TIME on new developments by using S. S. WHITE FLEXIBLE SHAFTS



WHERE new developments include flexible shafts either for REMOTE CONTROL or for POWER TRANSMISSION, you can save time by using S. S. WHITE Flexible Shafts. Here's why Applications are so numerous in the aircraft, automotive, machine tool, radio, electrical and other industries that a wide variety of fully developed S. S. WHITE combinations consisting of shaft, casing and fittings is available. Chances are good that among these many combinations is one that will meet your particular requirements without modification.

PUT YOUR PROBLEMS UP TO US

Time may also be saved by referring your flexible shaft problems to our widely experienced engineers for recommendations. Their cooperation is yours without obligation.

SEND FOR THESE BULLETINS

BULLETIN 1238—Flexible Shafts for POWER DRIVES

BULLETIN 38—Flexible Shafts for REMOTE CONTROL

BULLETIN 839—Flexible Shaft Combinations for AIRCRAFT

S. S. WHITE

The S. S. White Dental Mfg. Co.

INDUSTRIAL DIVISION

Dept. H, 10 East 40th St., New York, N. Y.

FLEXIBLE SHAFTS for POWER DRIVES, REMOTE CONTROL and COUPLING

Paint and light combine here to provide a pleasant working environment. This installation consists of 300-watt White bowl lamps in RLM Dome reflectors, spaced 10 ft. apart.



fusing Alzak aluminum insert. This insert insures more even distribution of the light but because of it, diffusion is not so good as is provided with the Glasssteel Diffuser. This latter unit, because of the opal glass diffusing globe which completely encloses the lamp, provides a high quality of illumination without excessive brightness, harsh shadows, direct or reflected glare.

For high-ceiling locations, there are special equipments which have a relatively concentrated distribution of light. This concentration of the light is required to minimize losses on the side-walls. These units are available in

mirrored glass, prismatic glass and Alzak aluminum.

Recent months have seen the development of numerous units for the fluorescent lamps. These equipments employ either a single lamp, two lamps or three lamps and may be had in either matte or specular finish to meet every industrial requirement.

Planning The System

Natural lighting should be utilized to its utmost, but even on a bright mid-summer day, the natural lighting is never adequate for efficient operation in plants where natural lighting comes through side windows. The reason for this is due to the rapid fallin-

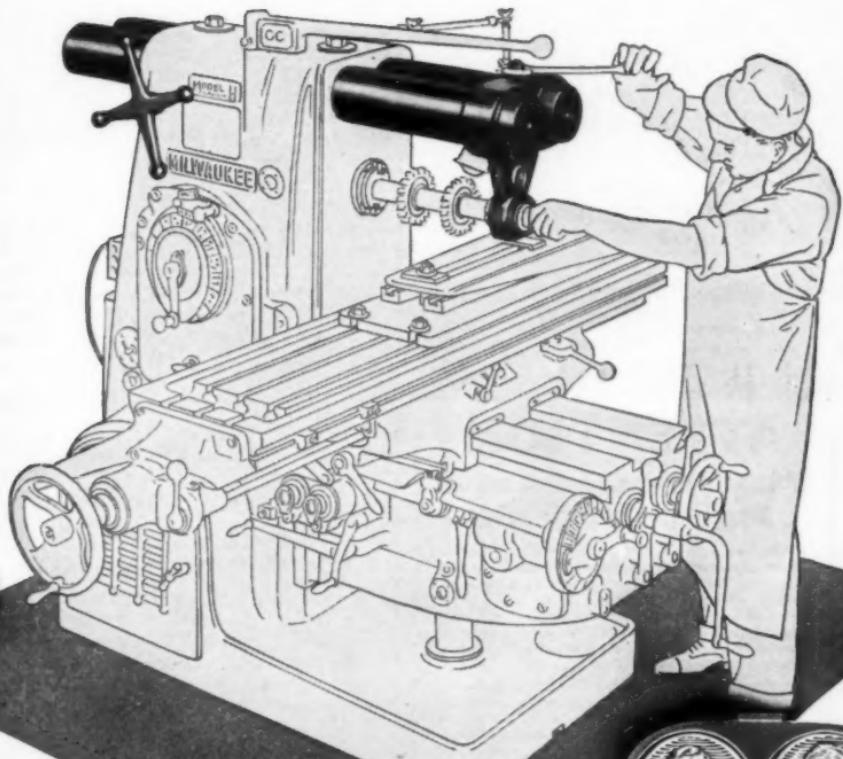
ILLUMINATION LEVELS CALCULATED FOR CONTINUOUS ROWS OF 46-WATT DAYLIGHT FLUORESCENT LAMPS IN RLM EQUIPMENT

Area per Reflector or Spacing Between Rows	Distance from Under- side of Reflector to Floor to be Not Less Than	Conditions Factor	Average Footcandles
21.6 Sq. Ft. or 5' Spacing	7' 6"	Average	50-62
26 Sq. Ft. or 6' Spacing	7' 6"	Average	41-51
30.4 Sq. Ft. or 7' Spacing	7' 6"	Average	35-44
34.6 Sq. Ft. or 8' Spacing	8'	Average	31-39
39 Sq. Ft. or 9' Spacing	8' 6"	Average	27-34
43.3 Sq. Ft. or 10' Spacing	9' 6"	Average	25-31

*These values are computed for the Daylight Lamp. To obtain values for the White Lamp add 25% to the above figures.

In the advancement and development of milling machines, the overarm has played an important part. The construction of the Milwaukee double overarm increases rigidity and provides easy access to the arbor and cutters—a most important convenience to the operator.

KEARNEY & TRECKER CORPORATION • Milwaukee, Wis. U. S. A.



KEARNEY & TRECKER



MILWAUKEE MILLING MACHINES

MOTORIZ



with MODERN Motor Drives
ATTENTION

Plant Managers and Superintendents

Uncle Sam's defense program has made most of us realize the need for increased production in the machine shop. The basic and best way to stop loss of time, power and production in the average machine shop is to **eliminate the line shaft**. This can be done quickly and cheaply at great savings in time and money with Individual Modern Motor Drives for all types of machinery.

Individual Modern Motor Drives effect a substantial saving in the cost of machine operation and at the same time make it possible for you to get practically the same production out of your old machines as you would get with new machinery.

Modern Drives create a flexible condition in the machine shop so that when the type of work changes the machinery can be rearranged quickly and at the least expense.

Get in step with faster, better and cheaper production in your plant.

Address your inquiries regarding Individual Modern Motor Drives to

Quality Hardware & Machine Corp.
5831 Ravenswood Ave., Chicago, Ill.

off of daylight the farther from a window one gets. This means that some employees are unfairly penalized because of work location, if dependence is placed on natural lighting as the major daytime illuminant.

As mentioned earlier, it is highly desirable to have a reasonably uniform level of lighting throughout the entire work area, not alone to minimize shadows, but also to enable the utilization of every square foot for work tasks.

It is really good practice to install adequate lighting on all parts of the production line, instead of merely at the final inspection. In this way, spoilage is reduced to a minimum since the defective elements are seen as they occur. They are thus rejected at their source, rather than after much time and expenses have been expended upon a product which must be rejected at the final inspection. Inspection then becomes a routine and final check upon work which has actually been "inspected" throughout its fabrication.

As an aid in determining the lighting value that would be obtained with different equipment and lamps, under different conditions, the accompanying tables are offered. It is suggested, however, that anyone contemplating a modernization program, consult with the lighting engineers of the local utility company. They are equipped to offer trained assistance in the solution of lighting problems.

Improved lighting for factory operation helps all workers do better work—to do their work more easily. A later issue will discuss the supplementary lighting problem and offer recommendations for specific tasks.

Torrington Airotor Bulletin

The Torrington Mfg. Co., Torrington, Conn., announces a new bulletin which gives complete details, with guaranteed performance charts and ratings, on its full line of Airotor blower wheels. Two additions to the Airotor line are described in this Bulletin—the 9" single width, single inlet, and the 10-1/2" double width, double inlet, spider end plate, Airotor Wheel.

LET A CP MAN

HELP YOU CUT

GRINDING COSTS



Near you is a CP grinder specialist who is ready to help you reduce grinding costs. He'll be glad to study your problem and recommend the correct type of grinder, speed and wheel size for a particular job. He is not restricted in his recommendations because the CP line of "Power Vane" Rotary Grinders is a complete one, comprising every size and speed of horizontal and vertical grinders.

Get in touch with the nearest CP office. Ask for the man who can help you cut grinding costs.

CHICAGO PNEUMATIC TOOL COMPANY

6 EAST 44th ST., NEW YORK, N. Y.

Birmingham, Boston, Buffalo, Butte, Chicago, Cincinnati, Cleveland, Denver, Detroit, Duluth, El Paso, Houston, Kansas City, Los Angeles, Milwaukee, Minneapolis, Philadelphia, Pittsburgh, St. Louis, Salt Lake City, San Francisco, Seattle.



POWER VANE GRINDERS

To help make
Munition Parts
**FASTER and
BETTER!**

U.S.A. **Stuart's**
Thred-Kut

PAT'D U. S. PATENT OFFICE

Here's why! Top-speed production — finish surpassing inspection requirements — and economy are the important reasons principal manufacturing armories, arsenals and government plants are using Stuart's Thred-Kut. In the machining of tough, stringy alloy metals, Stuart's Thred-Kut is outstandingly superior when the job demands velvet finish at maximum speed. Prove it in your own plant on munitions or other difficult cutting conditions.

A trial drum will start you on the way to top production and insure the quality of finish required. Stuart oil engineering service is

available to help you secure maximum cutting fluid efficiency. Phone or wire today!



You should have
this Handbook!

Send for this valuable 48 page handbook. It's full of data and engineering information that will help you produce munitions faster and better.



**FOR ALL CUTTING FLUID
PROBLEMS**

D. A. STUART OIL CO. Ltd.

CHICAGO, U. S. A.

EST. 1888

Warehouses in All Principal Metal Working Centers

"Light" Tools in Industry

By GEORGE A. FAIRMAN

THE infiltration of new ideas and new methods of operation is often so slow and unnoticed that at the surface, one cannot see or realize the constant changes that are going on until a complete check-up is made upon a particular field with an analysis of all that has happened.

A change of this type has been taking place in the machine tool field and it concerns the auxiliary use of "light-duty" machine tools for various machining operations. Up until a few years ago, all machines for production use were of the heavy-duty type and the aim of most manufacturers was to build their machines heavier and bigger as new models were introduced. This, of course, was consistent with the demand, but at the same time, it left a vacancy in that no machines were available for light duty use. With the introduction of heavier and more pow-

erful units, it meant that many times an exceptionally small job had to be put on a large, expensive machine with subsequent high cost in power consumption and operation. Often it meant that a heavy-duty machine was being tied up in the production line, and that material which should be run on the heavier machine had to be side-tracked until the lighter operations were performed.

Additional heavy machines could not and were not purchased because of their high cost, and due to the fact that the shop then would be over-equipped and the investment would be too great.

Within the last few years, there have been introduced into the industrial and production field, machines of a new type which have remedied this situation. They have proven of tremendous benefit to production shops. These machines are of the so-called "light-duty"

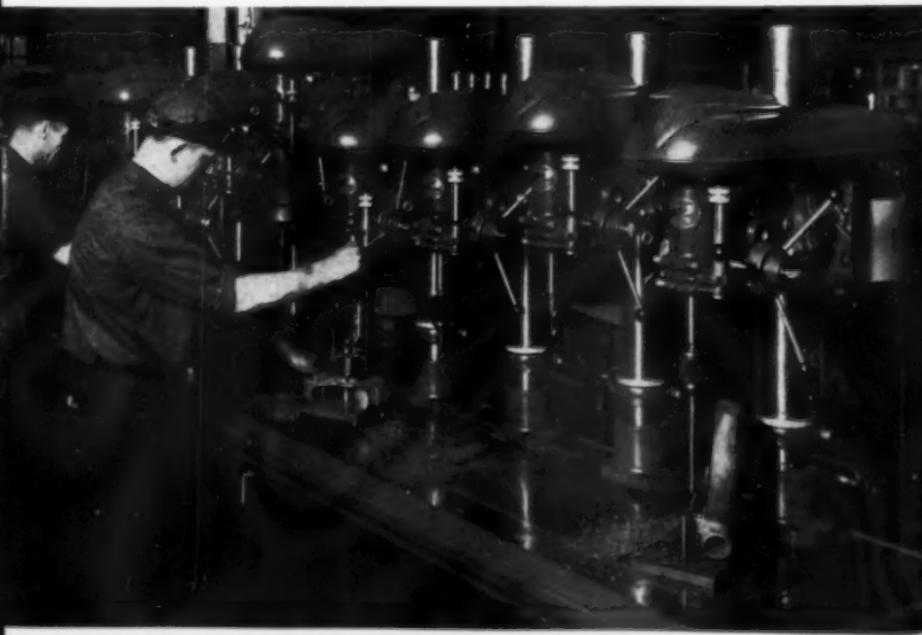




Fig. 2—Three heads drill three holes in three different positions simultaneously.

type and, although production men were skeptical at first as to their application for manufacturing jobs, it was soon learned that these machines fit in perfectly with production shop practice and perform so well that they have earned a place in standard production set-ups, and in some instances, represent the only machines used in certain departments or types of shops.

The machines to which we refer are units such as single and multiple spindle drill presses, metal-cutting band saws, grinders, cut-off machines, shapers, lathes and other units of similar character.

Machines of this type have slowly won their way into present-day production methods and their use actually has created a change in industry. Manufacturers using machines of this type have been able to reduce labor and operating costs; have found that these machines are adaptable and flexible in application; require much lower investment, and offer a number of other advantages, as will be detailed later. Changes of this kind have already taken place as can be seen by some of the illustrations and many plants throughout the country use these lighter machines for lighter jobs in their production lines.

An example was recently reported

where a manufacturer was in the market for a four-spindle drill press and had appropriated \$2,000.00 for this purpose. Upon investigation, he found that he could obtain a standard four-spindle machine of this type to which we have referred, for approximately \$400.00 and was, therefore, able to buy three of these machines, a total of twelve spindles for about \$1,200.00, saving his company \$800.00, and in addition, providing three times the capacity originally planned. In this particular instance, the machines were used for a comparatively light operation and the additional capacity thus obtained meant that all similar light operations throughout the plant were routed to these machines, thus allowing the heavier duty units to be free for the work they could best perform. Reports from this plant show that production has been increased materially, not only on the smaller operations but on the larger operations as well, making an overall saving which ran into a considerable figure and actually paid for the new machines within a comparatively short time.

In addition, ingenious arrangements have been produced by the manufacturers of these light-duty machines, as illustrated in Fig. 1. This shows an eight-spindle assembly made up of



24
YEARS

View of part of the Cone assembly floor

C O N E

In business to make profits—FOR YOU!

FOR the past 24 years, Cone has designed and built automatic screw machines for the profitable production of thousands of types of machine parts. During these years, industry has accepted Cone machines as the last word in extracting the last cent of profits from screw machining operations. Cone engineers are backed by the years of experience necessary to design a machine to meet the modern demand for parts of extreme accuracy—at a price to beat competition.

Four-, six-, and eight-spindle Conomatics cover a range of work to include the requirements of every high production manufacturer. These machines are fully described in the Conomatic catalogs—have you sent for your copies?

CONE AUTOMATIC MACHINE CO., Inc., Windsor, Vt., U.S.A.

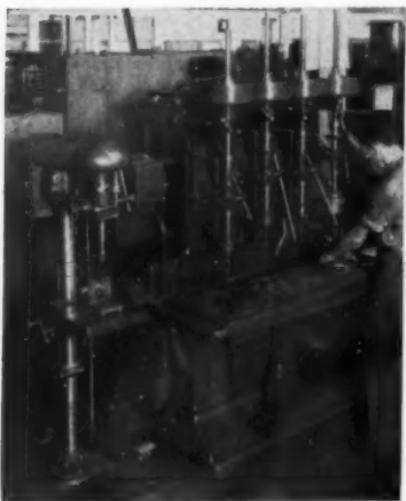


Fig. 3—Five spindles were needed so a handy light drill press was brought alongside the heavy duty unit.

individual units. As many spindles can be added as desired, because a sectional table is used and in this way, a production line of any length can be arranged. In this particular instance,

an eight-spindle assembly has been developed for regular production operations. Arrangements such as these can be made very economically when machines of this type are used, as compared with the cost of heavier multi-spindle units.

It has been found, too, that maintenance costs are extremely low on this type of equipment. One manufacturer reports a total of 16,016 hours of operation at a yearly maintenance cost of only \$6.80 which represents belt renewals once every six months. Most of these light-duty machines use sealed-for-life ball bearings which require no lubrication and in themselves insure long life with the subsequent low maintenance cost.

Since most of these machines are individually driven, and since the operation is relatively light, it means that smaller motors can be used so that power costs also are comparatively low. One manufacturer who has kept an accurate record of this feature, turns out over \$150,000 worth of accurately machined products a year on these particular machines at a power cost of \$8.60 a month, with a total investment in machinery of less than \$1,500.00, which shows the low maintenance and



Fig. 4—Individual units may be set on rails so they can be grouped for most efficient production.

WE WANT TO PROVE THE EASY WAY—



Weight 6½ lbs.

**Saves Up To 80% In
Time-Labor-Abrasives**

Speeds Up Production

**Produces A More
Uniform Finish**

Earns Extra Profits

THE *Easy* ELECTRIC SANDER Operates From Any Electric Outlet

FOR NEW OR MAINTENANCE WORK—sanding, rubbing or polishing . . . on flat, curved or irregular surfaces . . . wood, metal, bakelite, slate, leather, plastics, or composition materials . . . filler or sealer coats, shellac, varnish, lacquer, enamel and other finishes . . . the EASY Sander does the job much faster and produces a more uniform finish with less physical effort than is possible by hand or other methods.

MACHINE TOOL MANUFACTURERS

The EASY can't be beat for sanding filler (plaster) coats. Let us prove it the hard way—in your plant—on your product—with your own operators—that the EASY is all we claim.

Write for details today.



Reciprocating action of
the EASY mechanically duplicates
the back and forth motion of hand work.

A PRODUCT OF THE

DETROIT SURFACING MACHINE CO.
7432 W. DAVISON, DETROIT, MICHIGAN



Fig. 5—While parts are being turned, two drilling operations are performed.

investment cost realized when light-duty machines are used on jobs for which they are adapted.

Another feature appreciated by users of this type of equipment is the fact that these machines can be used for a large variety of operations and special set-ups can be made, using the light-duty machines as a basis. This is particularly true of drill press heads which can be mounted in any position and used for a wide variety of operations. Cost and time saving, etc., have thus been made as shown in Fig. 2. Here, three heads have been mounted in one assembly, all of which are operated by an air control so that the three heads drill three different holes in different positions all at the same time while the part is being tapped on another drill press, shown to the left. In this way, production time has been reduced greatly and the operator's idle time has been utilized.

Because this type of machinery is of necessity lighter in weight, it means that it is more portable than the heavier types of machinery. It means that at a moment's notice, a change can be made in the production line so that high efficiency is assured, as revealed

by Fig. 3. The job called for five different operations, and it was a simple matter for the operator to bring a single spindle machine alongside the heavy



Fig. 6—Trimming risers and gates in a foundry.



Dependable

To deliver — unfailingly and on schedule. That's dependability . . . It's solely on that kind of a reputation that JACOBS CHUCKS are selected to do most of the world's tool holding.

THE JACOBS
MANUFACTURING
COMPANY
HARTFORD
CONN., U.S.A.



IF IT'S A

Jacobs
IT HOLDS!



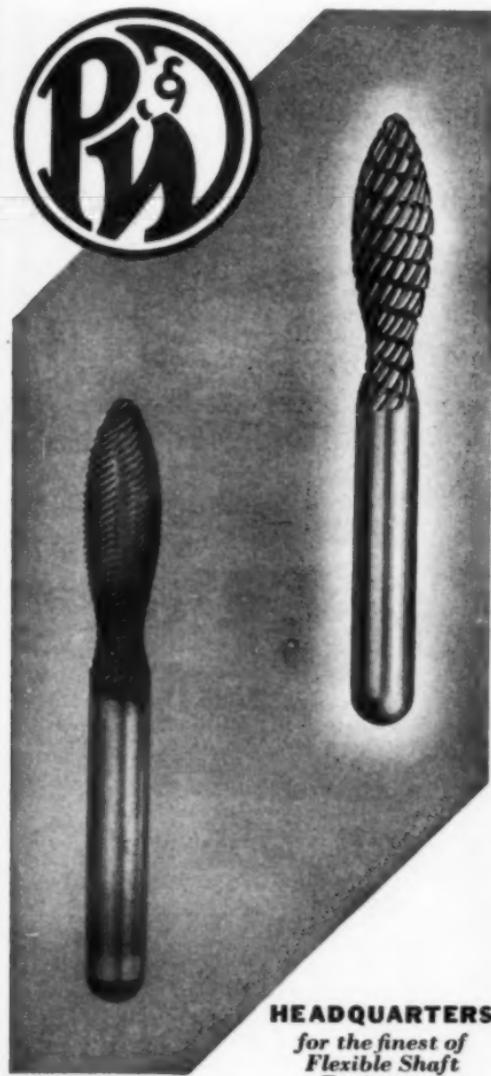
Fig. 7—Handy maintenance truck mounting grinder, drill press and metal cutting band saw.

duty four-spindle machine, thus giving him five-spindles in all. In ingenious arrangement of this type is also shown in Fig. 4 of an aviation manufacturing company, in which the individual production units are set on small rails so they can be grouped for the most efficient operation, making it possible to reassemble the machines in groups best fitted for their individual needs.

This flexibility and portability leads to a saving in labor costs, as shown by Fig. 5. Here, while the part is being turned on the turret lathe, the operator performs two extra operations on two drill presses which have been pulled up alongside his lathe. His idle time is eliminated and these two extra operations are obtained at no additional labor cost. Additional savings in labor have been made where most of the operations are light, and girls or women can be employed to operate the lighter duty machines. Many shops, such as those working in the non-ferrous metals, and die casting shops, are now almost completely equipped with light-duty machines and girl operators are used for this work.

In addition, since the machines are portable, it means that a larger number of workers can use the machines, or

as stated in another way, the machine has a wider application in its particular shop. As an example, the machine can be used in one department for a definite production operation, and when that operation is completed, the machine can readily be moved to another department for use there. This means that instead of trucking the work around from one department to another, it is easier to move the machine to the department and keep it there until that operation is finished. This portability also has other advantages as shown in a report recently submitted by a manufacturer of large moulding drums. These drums are approximately 22 feet long and have a large number of holes bored around the circumference from one end to another. With the old fashioned type of machine it meant that a total space of 44' had to be allowed for this particular operation which, of course, consumed a lot of floor space in the factory. Through the use of light-duty machines, a drill press was mounted on rails on the floor and moved from one end of the drum to the other. In this way the drum was left stationary and a considerable amount of floor space was saved for this particular manufacturer. Generally, the machines are so designed that they



We received the worn bur (left) and converted it into the ground-from-the-solid bur at the right. It can be resharpened again and again.

• • •

New Burs from Old!

Send us all your worn burs and rotary files . . . any make, size or shape—hand cut or mill cut. We will convert them into ground-from-the-solid burs, as good as new. We can resharpen these converted burs as they need it. Charges for this service are surprisingly low.

Dull burs—that formerly you would have discarded—will have their useful lives doubled and trebled. This reconditioning process will cut your bur costs tremendously. Write us for prices.

HEADQUARTERS
for the finest of
Flexible Shaft
Equipment

PRATT & WHITNEY

DIVISION NILES-BEMENT-POND CO.

• WEST HARTFORD, CONN.

Kellerflex Sales Department

take up but little floor space, which has been found to be an advantage in many shops where space is at a premium.

As stated before, the change that has taken place is not generally recognized, although upon investigation it will be found that thousands of light duty machines are being used in industry today, which have had an important effect upon production methods and operations and have actually revolutionized the operations in some plants. Other illustrations show some of the shops thus equipped, where as many as 18 drill press heads have been put in a single row for production operation.

In addition to the drill presses, light-duty metal cutting band saws have found their way into hundreds of factories where material of almost any type must be cut. These band saws equipped with metal cutting blades are used extensively to cut all types of brass, both in sheet and in tubular form, cast iron, copper, cold rolled steel, high-speed steel, monel metal, iron sheets, bars, malleable iron, babbitt,



Fig. 8—Another foundry application—trimming castings.

all types of plastics, fibrous material, hard rubber, slate, pipe, and many other materials too numerous to mention.

Foundries, for instance, use these machines to cut off the risers and gates, as shown in Fig. 6. Manufacturers making large pressed steel forms, such as radiator shells, use these metal cutting band saws to cut off the excess material after the piece has been formed.

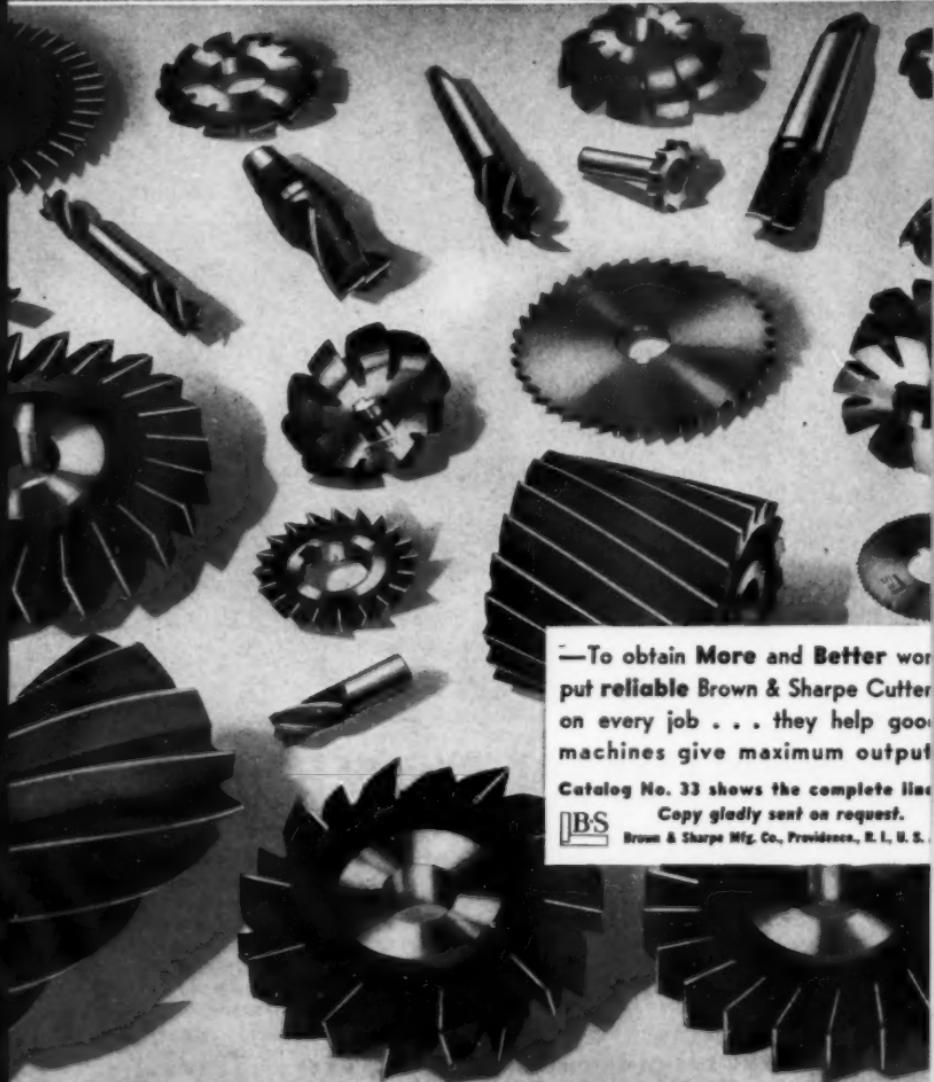
Some industries mount these machines on individual trucks, such as shown in Fig. 7, in which a grinder, drill press, and metal cutting band saw are mounted on a truck and used for airplane maintenance work at the U. S. Army Air Corps.

All indications show that a larger number of these machines are going to be used from year-to-year, as soon as production and machine shop men become acquainted with their wide use and their application, and experience has shown that when one or two of these machines are first installed, these lead to a large number of units used for a wide variety of operations throughout the entire plant.



Fig. 9—Vertical belt sander finishes plastic parts—and a light drill press pays its way.

GOOD CUTTERS ARE VITAL FOR TODAY'S PRODUCTION



To obtain More and Better work put reliable Brown & Sharpe Cutter on every job . . . they help good machines give maximum output

Catalog No. 33 shows the complete line



Copy gladly sent on request.

Brown & Sharpe Mfg. Co., Providence, R. I., U. S.

BROWN & SHARPE CUTTERS



because CUSHMAN ENGINEERING has

reached out beyond the limited horizon of everyday routine to develop new ideas in work-holding technique . . . improve the mechanical design and accuracy of Cushman Chucks . . . create new chucking methods and equipment for today's high speed and automatic machine tools.

Cushman enters this vital period of preparation for National Defense with the finest technical staff and plant equipment in the history of the Company. Day in and day out, in steadily increasing numbers, Cushman Chucks are leaving this plant to take their place on the production lines that will make America strong. Machine tool builders and operators well know that the smooth operation and sustained high accuracy of Cushman Chucks are controlling factors in the high-output production called for today.

Certainly, we're mighty busy. But we will welcome an opportunity to discuss your needs.

THE CUSHMAN CHUCK COMPANY, HARTFORD, CONN.

Representatives in NEW YORK - CHICAGO - PHILADELPHIA - ST. LOUIS - SAN FRANCISCO - RUTHERFORD, N. J.
Sold in Canada by Canadian Fairbanks Morse Co., Ltd.

CUSHMAN  **CHUCKS**
• A WORLD STANDARD • FOR PRECISION •

Cutting Tool Essentials

Explaining the Importance of "Red Hardness" and Toughness
in Cutting Tools

By LEO J. ST. CLAIR

THE two most important qualities of a cutting tool are "red hardness" and toughness. The success or failure of a cutting tool depends to a large extent on one or the other of these two important qualities. It facilitates choice as to the type of cutting tool that will give best performance on a given job, if one analyzes the job in the light of the heat produced by the cut and its resistance to cutting, chiefly resulting from the toughness of the piece being cut. The room temperature hardness of a cutting tool is usually of secondary importance, but at times, room temperature hardness is the prime or most important quality; for instance, taking light cuts on low tensile strength material such as bakelite, hard rubber, etc.

Let us first discuss the important quality of "red hardness" in a cutting tool. What does red hardness mean? "Red hardness" is the hardness of a cutting tool at the elevated temperature produced by removing a medium or heavy cut of a metal that has medium or great toughness or tensile strength. The word "red" is used in conjunction with the word "hardness" because tools with superior "red hardness" operate at such a high temperature near the point of the cutting tool, directly under the cut, that the tool at this point, actually becomes "red" hot, through the intense heat generated by the metal being removed. The cutting tool, at or near the tool point, often reaches a temperature of from 1200° to 1400° F. on heavy cuts. This temperature increases

as the tool becomes dull and often becomes so high as to produce tool failure due to heat softening.

The "red hardness" of a cutting tool is not dependent on the hardness of a tool at room temperature, as is believed to be the case by many. The "red hardness" depends more on the metallic composition of the cutting tool material itself. The metals—tungsten, chromium and cobalt are chiefly used in cutting tool composition to obtain this quality of "red hardness." These metals are found in varying amounts in most types of cutting tools.

Before development of high speed steel cutting tools, metals were machined with hardened carbon tool steel tools. These tools were brought up to a hardness of around 65 Rockwell C. They did a fair job on metals having low tensile strength, such as brass, bronze, etc., that usually do not produce much heat while being cut. They also did fairly well in light cuts on steel and iron, since such light cuts did not generate excessive heat. These carbon tool steel tools had to take a heavy cut on iron or steel at very low speeds to keep down the heat generation, because they lacked the quality of "red hardness." Elevated temperatures produced by cutting these metals at high speeds would soften the carbon steel tools so much that they would "burn off" and fail rapidly.

High speed steel was introduced about 40 years ago, and it soon proved superior to carbon tool steel. Why?

Because at elevated temperatures, high speed steel retained its hardness to a much greater degree than carbon steel tools. Heavy cuts on iron and steel could be taken at much higher speeds than with carbon tool steel tools.

Later on, Stellite tools made their appearance, and in a great many cases, these Stellite tools proved to be superior to high speed steel in their ability to remove metal at high speeds. Why? Because the "red hardness" of the Stellite tools was greater than the "red hardness" of the high speed steel tools. Stellite retained its hardness to a greater degree than high speed steel under the cutting temperatures generated by the cuts.

A recent development in the cutting tool field is known as Rexalloy. The composition of Rexalloy is somewhat similar to Stellite, and hence its "red hardness" is about the same. The processes used in its manufacture have made Rexalloy unusually tough for tools of this type.

Super High Speed Steel

During the past few years, super high speed steel tools have been introduced on many jobs. These contain a varying amount of cobalt up to 14%. That is why they are usually known as cobalt high speed steel tools. They have a higher red hardness than the original 18-4-1 high speed steel.

In 1928, cemented carbide tools were offered for sale to American machine shops. These tools, in many cases, removed metal a great deal faster than the original and the cobalt high speed steel tools, as well as the Stellite and Rexalloy tools. Why? Because the "red hardness" of the cemented carbide tools was very much superior to any of these other tools. These cemented carbide tools also had a fourth quality that often is of great importance in cutting tools, which is their great resistance to "cratering." Cratering is due to the abrasive action of the metal chip on the top face of the tool, wearing a depression or crater on this

face which helps to reduce tool life in many cases.

One of the latest additions to the cutting tool family is known as Tantung. This metal has a red hardness next to cemented carbide. Its most remarkable quality however is its great resistance to "cratering" on heavy cuts in mild and tough steels. This great resistance to cratering increases its life, compared to high speed steel as much as 5 to 10 times on hogging cuts. So far, this material has not proven itself on light and medium cuts, due primarily to its lack of toughness or "edge strength."

The factor controlling cutting speed and tool life is primarily the "red hardness." The relations between room temperature and "red hardness" at about 1200° F (normal temperature at the point of a cutting tool while removing metal on a roughing cut) for the various types of cutting tools are shown by the accompanying table.

Type of Tool	(Rockwell C.)	Approximate room temperature "red hardness" at 1200° F.
--------------	---------------	---

1. Carbon tool steel	65	40
2. 18-4-1 high speed steel	63	50
3. Cobalt high speed steel	63	54
4. Stellite & Rexalloy	62	56
5. Tantung	60	58
6. Cemented carbide	72	70

"Red hardness" often is the most important quality required on some work, while on other work, "toughness" is of greater importance than "red hardness."

Cemented carbide tools have done wonders on jobs for which they were adapted, because of their higher degree of "red hardness." Yet there have been jobs which have been handled to better advantage with 18-4-1 which we shall henceforth call "high speed steel." Super high speed steel we shall refer to as "cobalt high speed steel" to differentiate. This brings out the fact clearly that "red hardness" is not the only quality required of a cutting tool. Toughness or "edge strength" often is of greater importance than

Sundstrand Bench Centers

Convenient, Reliable, Economical



Precise Means for Rapid Checking Between Centers



Widely used in toolrooms, production departments, repair shops, garages; Sundstrand Bench Centers are unexcelled for checking work precisely and rapidly between centers. They are accurate, rigid, compact, portable, durable, economical. Features include quickly adjustable heads, hardened and ground centers, accurate taper fit in spindles. Spring-pressed spindle of right-hand head, with retractor lever, speeds work-handling. Made in 7 sizes up to 12" x 60".

• Bulletin SBT-436 describes and illustrates Sundstrand Bench Centers, Balancing Tools, Airport Service Equipment. Write for your copy today.

DEALERS—Increase profitable sales with high quality, big-value Sundstrand Open Line Tools. Besides Bench Centers, the Open Line includes Balancing Tools in nine sizes; and manual Index Bases. Investigate.

Sundstrand Machine Tool Co., 2535 Eleventh St., Rockford, Illinois, U. S. A.

RIGIDMILS - STUB LATHES

Tool Grinders • Drilling and Centering Machines
Hydraulic Operating Equipment • Special Machinery



"red hardness." For instance, the greater toughness of the high speed steel tool allows such a tool to be used on planing tough armor plate steel, while other types of cutting tools, fail on such an operation due to lack of toughness or edge strength.

I would tabulate the toughness or edge strength of the different cutting tools as follows:

1. Weakest	Cemented carbide
2.	Tantung
3.	Cobalt high speed steel (10 to 14% cobalt)
4.	Stellite
5.	Rexalloy
6.	Medium cobalt high speed steel (4 to 8% cobalt)
7. Strongest	18-4-1 high speed steel

It is conceded, that the ability of a cutting tool to remove the most metal on a given composition or metal depends chiefly on the two qualities of edge strength and "red hardness." In my experience, Rexalloy has performed well in many instances, showing a good

balance of red hardness and toughness. In one particular case, the feed per revolution was increased 200%, while the speed in revolutions was decreased only 50%. This combination permitted a reduction in cutting time on this job of 33-1/3%.

In many shops throughout the country, cemented carbide tools are setting new records for metal cutting. On a thousand operations, a prominent tool manufacturer recently stepped up production more than 30% by adopting modern carbide tooling.

Since "red hardness" and toughness are of great importance in cutting tools in some cases, while room temperature hardness and resistance to cratering are more important in other cases, the choice of cutting tool will depend on the kind of work being done. Let us tabulate various kinds of work and the most important qualities in my opinion that cutting tools must have to do this work economically.

TABLE A
Most important quality or qualities for cutting tool.

Kind of work.	
1. Light finish and semi-finish cuts on:	
A. Compositions.....	Since very little heat is generated, room temperature hardness is most important (toughness not required). Diamond tools are often best.)
B. Non-ferrous alloys.....	Room temperature hardness most important, since very little toughness is required due to low tensile strength of alloy being cut, and heat generation while cutting is low.
C. Normal Cast Iron.....	Room temperature hardness most important. Toughness not required even on jump cuts.
D. Alloy Cast Iron..... Semi-steel iron	Room temperature hardness most important. Toughness not required on steady cutting, but toughness must be considered on jump cuts.
E. Mild Steel Forgings and Bar Stock.....	Room temperature hardness most important. Toughness not required on steady cutting but is needed on jump cuts.
F. Tough Steel Forgings and Bar Stock.....	"Red hardness" most important due to the high heat produced, due to high tensile strength of metal being cut. Toughness not particularly required on steady cuts but becomes important on jump cuts, due to the high tensile strength of the tough alloy steels.
G. Steel Castings.....	Toughness or "edge strength" is most important due to the hard spots and blow holes usually encountered on such work. Red hardness is next most important quality.
H. Chilled Iron and Welded Stellite.....	"Red hardness" and "edge strength" required on chilled iron on wide feed work. On light feed work on Stellite and chilled iron, room temperature hardness is most important along with a fair "red hardness."
2. Medium Roughing Cuts, (up to 1/32" feed) on:	
A. Compositions.....	Room temperature hardness most important since very little heat is generated while cutting.
B. Non-Ferrous Alloys.....	Room temperature hardness usually most important due to low tensile strength of most non ferrous alloys. On the tougher alloys, toughness of tool must be considered, especially on jump cuts.

with POLISHED SMOOTHNESS!

**That's how this
NEW DELTA MACHINE
Cuts
Copper, Brass, Aluminum**

This new Delta Cut-off machine is designed especially for cutting copper, brass, aluminum and other non-ferrous metals with polished smoothness. It is equipped with a special high-speed steel blade and oiling device which feeds cutting oil to the blade. It leaves the cut perfectly smooth, thus eliminating additional finishing and polishing operations. At these remarkably low price levels you can actually get two cut-off machines for the price of one—machines that can be used for scores of jobs, and quickly pay for themselves in time and money saved!

**Cuts These Materials With
Polished Smoothness**

Solid Sections: Soft Brass up to $1\frac{1}{2}$ " diameter; Half-Hard Brass, up to $1\frac{1}{4}$ " diameter; Aluminum, up to $1\frac{1}{2}$ " diameter; Aluminum Extruded Sections, up to equivalent of 2 sq. in.; Copper, up to $1\frac{1}{2}$ " diameter, or equivalent of 2 sq. in.; Magnesium (Dow Metal), up to $1\frac{1}{4}$ " diameter; Micarta and Similar Rods, up to $1\frac{1}{2}$ " diameter.

Tubular Sections: Soft Brass; Hard Brass, Aluminum, Copper, Dow Metal, Micarta and Similar Tubing, all up to 2" diameter.

Has Many Special Features

This improved Cut-Off Machine is ruggedly constructed with heavy castings throughout—wide spaced Timken roller pivot bearings and double arbor sealed-for-life bearings requiring no lubrication—powerful Texrope V-Belt drive—adjustable fence—accurately machined table. It is perfectly balanced, making for easy operation—cuts material at any angle and embodies unusual safety features such as husky chip guard, belt and wheel guards.



No. 1631
Non-ferrous
Cut-off Machine,
With blade guard,
belt guard and chip
guard.

**Send for Special
Cut-Off Machine
Bulletin**

giving full details
and prices on this
Delta Cut-off Ma-
chine and all ac-
cessories.

Please send me special
bulletin on the new Delta Cut-
off Machine for non-ferrous metals. Also send
latest Delta Catalog of Industrial Power Tools.
Name _____
Address _____
City _____ State _____

**DELTA MFG.
CO.**
INDUSTRIAL DIVISION

686 East Vienna Avenue, MILWAUKEE, WIS.

- C. Normal Cast Iron..... "Red hardness" is most important since high "edge strength" is not required due to low tensile strength of normal cast iron.
- D. Alloy Cast Iron..... "Red hardness" is most important since the toughness of the metal being cut generates much heat. Fair "Edge strength" required, especially on jump cuts.
- E. Mild Steel Forgings..... "Red hardness" most important on steady cuts. "Toughness" most important on jump cuts.
- F. Tough Alloy Steel..... Forgings and Bar Stock In most cases, "toughness" most important, especially on jump cuts. "Red hardness" also vital because of high temperatures generated on this high strength material.
- G. Steel Castings..... Best combination of "red hardness" and "Edge strength" is required, due to heat generation while cutting, and likelihood of hard spots and blow holes existing.
- 3. Heavy Roughing Cuts, ($\frac{1}{8}$ to $\frac{3}{32}$ " feed) on:**
- A. Compositions..... Room temperature hardness most important.
- B. Non Ferrous Alloys..... Room temperature hardness is most important and "red hardness" is next most important on steady cut work. On jump cuts, "edge strength" is most important on the tough non ferrous alloys.
- C. Normal Cast Iron..... "Red hardness" most important, along with a fair "edge strength." On jump cuts, "Edge strength" becomes most important, and "red hardness" is next most important.
- D. Alloy Cast Iron..... Semi Steel Iron Toughness most important due to high tensile strength of material being cut. "Red hardness" almost as important due to high heat generated.
- E. Mild Steel Forgings..... and Bar Stock Toughness most important, along with good "red hardness."
- F. Tough alloy Steel Forgings and Bar Stock Best combination of toughness and "red hardness" is required because of the high temperatures generated and the high tensile strength of material being cut.
- G. Steel Castings..... Best combination of "red hardness" and toughness required on the steady cuts. Toughness most important on jump cuts.
- 4. Extra Heavy Roughing Cuts, ($\frac{1}{4}$ " feed or more) on:**
- A. Compositions..... "Red hardness" most important. Toughness not required due to low tensile strength of material being cut.
- B. Non Ferrous Alloys..... Best combination of "red hardness" and toughness required.
- C. Normal Cast Iron..... Toughness important, along with good "red hardness", on steady cuts. On jump cuts, toughness is the most important quality.
- D. Alloy Cast Iron..... Semi Steel Iron Toughness of extreme importance.
- E. Mild Steel Forgings..... and Bar Stock Resistance to cratering and "red hardness" most important on steady cuts. On jump cuts, toughness becomes most important quality.
- F. Tough Alloy Steel Forgings and Bar Stock Resistance to cratering and "red hardness" most important on steady cuts in most cases. On most jump cuts, toughness is of paramount importance.

With the aid of these tabulations of kinds of work and most important qualities required for types of cutting tools, we can now make up a table showing the kinds of work being done and the types of tools best suited for the work. We will list my 1st, 2nd and 3rd choices of types of tools. We will note the change of type of tool when neces-

sary due to the difference in quality requirement of the cutting tools on steady cuts versus jump cuts. We will qualify carbide tools by designating them as hard, medium hard and tough carbides. We will qualify the cobalt high speed steel tools as high cobalt or medium cobalt H.S.S.

TABLE B
Choice of Type of Tool

Kind of Work	1st	2nd	3rd	Reference Table A
1. Light Finish and semi-finish cuts on:				
A. Compositions	Hard carbide	H.S.S.	Medium cobalt H.S.S.	1 A
B. Non ferrous alloys ...	Hard carbide	H.S.S.	Medium cobalt H.S.S.	1 B
C. Normal Cast Iron	Hard carbide	Medium cobalt	Stellite	1 C

LOW-TEMPERATURE-MELTING ALLOYS that increase manufacturing profits



CERROMATRIX (Melting Temp., 250°F.) For securing punch and die parts, anchoring machine parts without the expense of a drive fit, engraving machine models, models, stripper plates, chucks, etc.



CERROBASE (Melting Temp., 255°F.) For reproducing master patterns, models for electroforming, engraving machine models, proof casting for forging dies, etc. Perfect reproduction of intricate detail.



CERROBEND (Melting Temp., 158°F.) Used as a filler in bending thin-walled tubes to small radii-easily removed in boiling water. Also used for templates in forming dies and for other purposes.

Send For Literature

CERRO DE PASCO COPPER CORPORATION

40 WALL STREET

NEW YORK, N. Y.

British Associates: Mining & Chemical Products Ltd., London, England

—DISTRIBUTORS—

BROOKLYN, N. Y.—Belmont Smelting & Refining Co., 330 Belmont Ave.

PHILADELPHIA—Machine & Tool Designing Co., 1011 Chestnut St.

CLEVELAND—Die Supply Co., 1390 East 30th St.

DETROIT—Curtis Industrial Designing Engineers, 227 Iron St.

CHICAGO—Sterling Products Co., Inc., 121 North Jefferson St.

MILWAUKEE—Harry C. Kettelson, 329 N. Milwaukee St.

SAN FRANCISCO—Jamison Steel Corporation, 508 Fourth St.

LOS ANGELES—Jamison Steel Corporation, 2168 East Olympic Blvd.

MONTRÉAL, CANADA—Dominion Merchants Ltd., 180 Vallee St.

D.	Alloy Cast Iron and....	Medium carbide semi-steel iron	H.S.S.	Rexalloy		1 D
E.	Mild steel Forgings	Hard carbide and bar stock.....	Medium cobalt	Stellite	Rexalloy	1 E
F.	Tough Steel Forgings	Medium carbide and bar stock	H.S.S.	Stellite	Rexalloy	1 F
G.	Steel Castings	Medium carbalt	High cobalt	Stellite	Rexalloy	1 G
H.	Chilled Iron and Welded Stellite	H.S.S. Hard carbide	H.S.S.	Tough carbide	Stellite	1 H
					Medium cobalt	
					H.S.S.	

(Interrupted cuts not likely to change type of tool due to lightness of cut.)

**2. Medium Roughing Cuts,
(up to 1/32" feed) on:**

A.	Compositions	Hard carbide	H.S.S.	Medium cobalt	2 A
B.	Non-Ferrous Alloys....	Medium carbide	H.S.S.	H.S.S.	2 B
C.	Normal Cast Iron.....	Medium carbide	Rexalloy Stellite	Medium cobalt	2 C
D.	Alloy Cast Iron.....	Tough carbide Semi steel iron.....	Rexalloy Stellite	High cobalt	2 D
E.	Mild Steel Forgings....	Medium carbide and bar stock	Rexalloy Stellite	High cobalt	2 E
F.	Tough Alloy Steel Forgings and bar stock	Rexalloy Stellite	(1st on jump cuts) Carbide, tough	High cobalt	2 F
G.	Steel Castings	Rexalloy Stellite	Medium cobalt	H.S.S.	2 G
				(1st on jump cuts)	

Choice of Type of Tool

Kind of Work	1st	2nd	3rd	Reference Table A
3. Heavy Roughing Cuts, (1/8" to 3/32" feed) on:				
A. Compositions	Hard carbide	H.S.S.	Medium cobalt	3 A
B. Non Ferrous Alloys....	Medium carbide	Rexalloy Stellite	High cobalt	3 B
C. Normal Cast Iron.....	Rexalloy	(1st on jump cuts) Tough carbide	High cobalt	3 C
D. Alloy Cast Iron.....	Rexalloy Semi steel Iron	High cobalt H.S.S.	Tough carbide	3 D
E. Mild Steel Forgings	Rexalloy and bar stock	High cobalt H.S.S.	H.S.S.	3 E
F. Tough Alloy Steel forgings and bar stock	Rexalloy	Medium cobalt H.S.S.	(1st on jump cuts) H.S.S.	3 F
G. Steel Castings	Rexalloy	H.S.S. (1st on jump cuts)	Medium cobalt H.S.S.	3 G

**4. Extra Heavy Roughing Cuts,
(1/8" feed or more) on:**

A.	Compositions	Medium carbide	Stellite	High cobalt	4 A
B.	Non Ferrous Alloys	Rexalloy	Rexalloy	H.S.S.	4 B
C.	Normal Cast Iron	Stellite	Tough carbide	High cobalt	4 C
D.	Alloy Cast Iron	H.S.S.	Medium cobalt	H.S.S.	4 D
E.	Semi steel iron	H.S.S.	Medium cobalt	H.S.S.	4 E
F.	Mild steel forgings....	Tantung	Rexalloy	H.S.S.	4 F
G.	and bar stock			(1st on jump cuts)	
F.	Tough alloy steel.....	Tantung	H.S.S.	Rexalloy	4 F
G.	forgings and bar stock			(1st on jump cuts)	
G.	Steel Castings	H.S.S.	Tantung	Rexalloy	4 G

Note: These tabulations cover the following machining operations:— Turning, boring, facing, milling, counterboring, parting, and planing. Drill-

ing, tapping and threading are not included due to the fact that these operations require a tool with a high tensile strength to resist the torque pro-

How to Reduce Handling and Speed Inventory Count

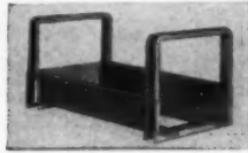
Because STACKBINS are portable containers—not fixtures—parts and materials can be weighed, counted or carried to departments without being transferred from one container to another! In the stockroom, STACKBINS are instantly accessible when the contents are needed—without disturbing any but the wanted one.

Handling is reduced—inventory count is speeded—time and labor costs are cut—with the ideal storage combination, STACKBINS in STACKRACKS. Carried in stock in 7 sizes.

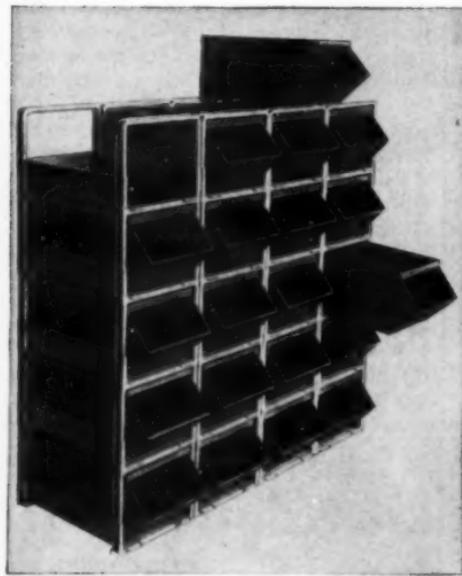
STACKBINS are individual hopper-fronted stacking bins designed for storage, transportation and assembly.



STACKRACKS are individual units which lock together without the use of tools to form storage racks of any capacity. STACKBINS slide into them like drawers.



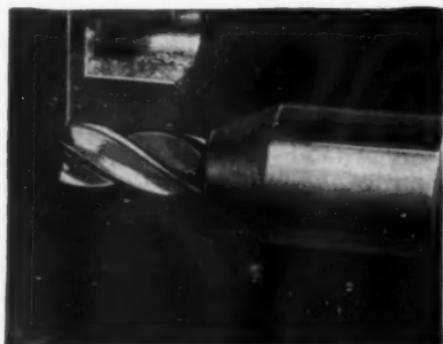
STACKBIN
Corporation
55 Troy St.,
Providence
R. I.



This patented storage system will start saving money for you at inventory time—and keep saving all year. Write today for complete information and low prices.

“Stacked and Still Accessible”

MORE SPEED LONGER LIFE



with PUTNAM Hi-Speed END MILLS

In an operation such as that illustrated—milling $\frac{3}{8}$ " slots in a die block—Putnam End Mills permit the maximum speed and feed. In addition, manufacturing and heat treating methods assure long, trouble-free service. Why not prove to your own satisfaction—by actual use on your machines—that the end mills which do "cut faster and last longer" are produced by Putnam?

PUTNAM TOOL CO.
2981 Charlevoix Ave., Detroit, Mich.

duced by these operations. High speed steel has proven to be the most acceptable type of tool material for such operations.

We have not mentioned the diamond tool in Tables A or B because its use is comparatively limited in metal removal. The diamond has the highest room temperature and "red hardness" of any material available but its lack of toughness limits its use except on low tensile strength materials or on extremely light cuts on higher tensile strength materials. The diamond tool certainly brings out clearly the great importance of toughness or "edge strength."

In conclusion, it would be well to point out that "red hardness" is very important on work where hard spots or sand are encountered while machining metals. On roughing, given two tools of equivalent toughness, the tool having the higher "red hardness" will stand up better when sand or hard spots are encountered, since its wear resistance at the high heats generated will be superior, due to its greater "red hardness". Also in machining metals that have been heat treated to such hardness as to be almost not machinable with H.S.S. due to the very high temperatures generated by such metals, a tool with a superior "red hardness" quality is indicated and will do the work more economically than H.S.S.



SAROSTON LATHE GRINDER

A sturdy tool for
precision or production
grinding

Use wheels on either end of the spindle

Sizes up to 2 H. P.

THE SAROSTON CO.
251 Park St., Upper Montclair, N.J.

Tapping Problems Solved With This New Tapping Machine!



This new Procunier Universal Tapping Machine with the latest Tru-Grip Tap-Holder, embodies revolutionary features that increase tapping output and greatly increase tap life. These features include: 1. Four speeds, ranging from 390 to 2050 R.P.M. efficiently handle jobs for which conventional high speed tapping machines are inadequate. 2. One machine handles tap sizes from No. 2 to $\frac{1}{2}$ " through two interchangeable heads. 3. Extra long Spiral Compensating Springs conveniently located, with wide range hand-screw adjustments, maintain pre-set tap feeding and reversing pressures INDEPENDENT OF OPERATOR. (Close-up view shows the tapping of steel anchor nuts for aeroplanes with the Procunier Universal Tapping Machines maintaining Class 3 Fit).

**TAP ESTABLISHES
ITS OWN LEAD!**

The new Procunier Universal Tapping Machine is so designed that it actually allows the tap to establish its own lead. There is nothing more accurate than the tap itself in thread-cutting—so maximum tapping efficiency is attained where tap is free to establish its own lead in cutting the thread.

This means more accurate tapping with every thread uniform, greater production with less spoiled work and less tap breakage. Send coupon for illustrated bulletins giving full details and prices, on Procunier Universal Tapping Machines, High Speed Tapping Head, and Tru-Grip Tap Holder.

PROCUNIER

**Safety Chuck
Company**

14 S. Clinton St.,
Chicago, Illinois

Procunier Safety Chuck Co.
14 S. Clinton St., Chicago, Illinois

Send me Bulletins on: Universal
Tapping Machines, High Speed Tapping
Heads, Tru-Grip Tap Holder.

Name _____

Address _____

City _____ State _____



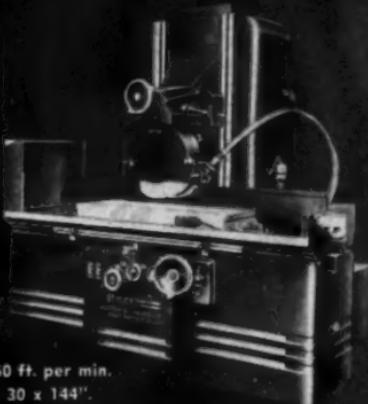
Look . . .
over these
attractive
**SURFACE
GRINDERS**

No. 55—Table speeds up to 125 ft. per minute.
Working surface—12" x 36".

They offer you new standards of grinder performance—new production economies and new facilities for improving your products.

Write for catalogs giving complete details of these and other **GRAND RAPIDS** Grinders.

Style "F"—Table speeds up to 150 ft. per min.
Working surface—12 x 36" to 30 x 144".



GALLMEYER & LIVINGSTON CO.

405 STRAIGHT AVE., S. W. • GRAND RAPIDS, MICHIGAN

Recent Developments In Balancing Machines

(PART-II)

By WERNER I. SENGER

IN THE November issue, the objects and methods of balancing rotating members were discussed, leading up to the latest practice on motor armatures.

Direct current armatures are frequently corrected for balance by adding solder to the banding wires. For this class of work the meter "M" is adjusted to read the length of wire solder in $\frac{1}{16}$ ths of an inch required to produce balance. To facilitate measuring of the required length of solder, the device shown in Figure 19 was developed. A spool of wire solder is here carried on a pin and the wire is fed by means of the graduated handwheel. The meter of the balancing machine may be adjusted to correspond with the graduations on the handwheel of the solder measuring device. So, if the

operator turns the handwheel to the number corresponding to the meter reading and strikes the shear button, the length of solder required for correction will be cut off. Obviously, no skilled operator is required for such an operation.

Now, one may well ask, "How does the machine make it possible to directly read the amount of practical correction to apply in each of two selected

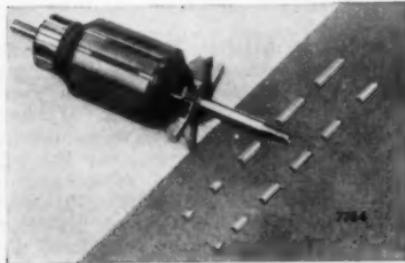


Fig. 18—Small motor armature and extruded aluminum balancing weights which are pressed into the slots.



Fig. 19—Measuring device which cuts off the required balancing weights—in this instance, bits of wire solder.

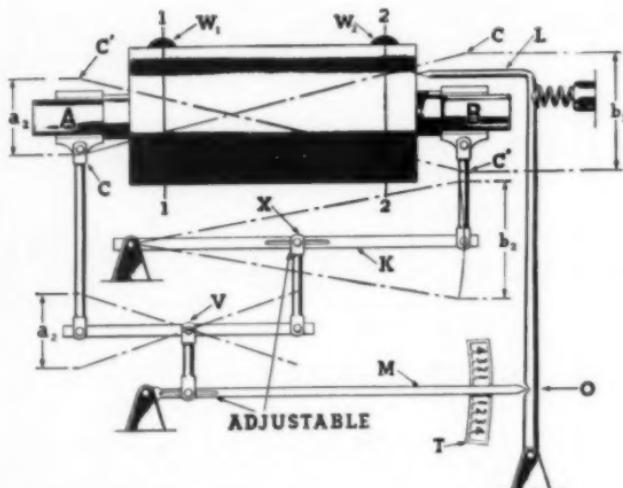


Fig. 20—Mechanical analogy illustrating the method of determining the correction to be applied to each of two selected planes.

planes?" This question may be most easily answered by use of a mechanical analogy (Figure 20). The part to be balanced is here represented as a cylinder which is supported on flexibly mounted bearings at "A" and "B" in the manner previously described. The transverse planes 1-1 and 2-2 represent the arbitrarily selected planes where corrections may be most conveniently made. To measure correctly the unbalance W_1 in plane 1-1 from the movements of the supports "A" and "B," the portion of the movement of the supports caused by unbalance W_2 in plane 2-2 must be eliminated.

First, assume that the cylinder is balanced. Then insert the unbalance W_2 in plane 2. Under rotation, due to the presence of unbalance W_2 , the axis of the cylinder will oscillate between lines C-C and C'-C'. The vibration or movement b_2 of the support "B" will be greater than movement a_2 of support "A." The vibration or movement of each support will be proportional to the unbalance W_2 and the direction of motion of support "A" will be opposite to the motion of support "B."

Assume that there is a lever "K" pivoted at one end and attached to support "B" at the other end so that it will oscillate from the motion of

that support. There will then be a point "X" on lever "K" which will have the same amount of movement as support "A" but opposite in direction. The lever "V" is provided to combine the motion of lever "K" and support "A." One end of lever "V" is attached by means of a link to the point "X" on lever "K." The other end of lever "V" is attached by means of a link to support "A." Therefore, for the condition just considered, the ends of lever "V" have the same amount of motion but in opposite directions. Then, the mid-point of this lever will have no motion even though supports "A" and "B" are vibrating due to the effect of unbalance W_2 in plane 2-2. This system of levers, then, provides a means for eliminating the effect of W_2 .

Now, if unbalance W_1 in plane 1-1 is the only unbalance in the piece, there will be a large vibration of support "A" and of the end of lever "V" connected to this support. The motion of support "B" due to unbalance W_1 will be small and the motion of the end of "V" which is connected throughout lever "K" to support "B" will be extremely small. Therefore, the mid-point of lever "V" will have a definite amount of motion which will be proportional to the unbalance W_1 .

and will not be affected by unbalance W_2 which might be placed in plane 2-2.

The motion of the mid-point of lever "V" is greatly amplified by lever "M" and the amount of this amplified motion may be read on scale "T," and is a measure of the amount of unbalance W_1 without any influence from the unbalance W_2 . As the amount of amplification may be varied the value of the units on scale "T" may be adjusted to read in practical correction units.

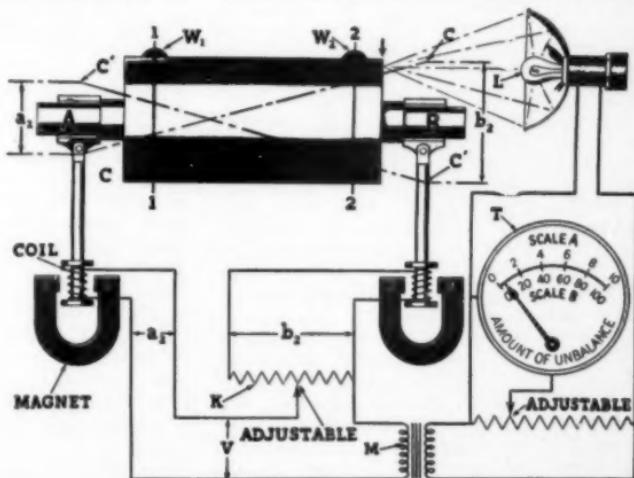
The angular location of the unbalance W_1 is recorded on the work by means of the center punch "L" which is attached to the end of a long spring-loaded lever which continuously tends to force the center punch into the work. At the mid-point of the movement of lever "M," its point enters a vee notch (0), permitting the center punch "L" to strike the work to record the angular location of unbalance W_1 . With two such lever systems (one for each end), the amount and location of the unbalance in any two selected planes can be determined and the indications for each plane will be entirely free from the effect of unbalance in the other plane.

Obviously such a mechanical arrangement cannot be expected to operate properly because of friction or lost

motion in the pivot points of the levers which introduce large errors. Further, any attempt to provide amplification of the order of 1,600,000 to 1 by means of lever "M" would be impossible due to physical limitations and inertia effects. However, by electrical means it is possible to obtain the desired results easily and to high orders of accuracy. In Figure 21 is shown a schematic diagram of the electrical system used in the Dynetric Balancer. This diagram uses the same letter as was used in Figure 20 to represent an element performing the same or a similar function. Here the work piece is again represented as a cylinder which is carried in the same kind of flexible supports at "A" and "B" as previously described. Attached to supports "A" and "B" are coils which are in the fields of powerful permanent magnets. The vibration due to unbalance of the supports "A" and "B" and the attached coils causes voltage a_2 and b_2 to be generated in the coils. The voltages thus generated are proportional to the movement of supports "A" and "B."

Again assume that the only unbalance in the work piece is the unbalance W_2 . When the work is rotated, the unbalance W_2 will cause a large motion of the support "B" and will cause to be generated a correspondingly large voltage b_2 . The lesser motion of

Fig. 21 — Schematic diagram of the electrical system employed in the Dynetric balancer.



the support "A" will cause a smaller voltage a^2 to be generated. By means of the voltage divider "K," a portion of b^2 may be chosen which will be equal to a^2 , but opposite in value so that the resultant voltage "V" will be zero for unbalances of any magnitude in plane 2.

Now, with the same electrical system, assume unbalance W_1 in plane 1-1 is the only unbalance in the work. Unbalance W_1 in plane 1 will cause a large motion of support "A" and a correspondingly large voltage a^2 , and will cause a small motion of support "B" and a small voltage b^2 . Now, if the voltage a^2 and a small part of the small voltage b^2 be added, there will be a definite voltage "V" due to unbalance W_1 . This voltage "V" may be amplified as much as 1,600,000 times by means of transformers, radio tubes, or other devices at "M." This voltage, or any desired portion, is supplied to the amount meter which will indicate the amount of unbalance correction to be applied to the work. The portion of voltage selected will be determined by the practical correction method selected so that the meter reading will indicate the required correction for balance in $1/64$ " of depth of a given size of drill or in $1/32$ " of length of $1/8$ " wire solder or other practical correction unit.

The angular location of the unbalance W_1 is determined by means of a stroboglow lamp (L). This lamp is caused to flash for ten-millionths of a second each time the amplified voltage changes from negative to positive. The flashing of the lamp at each revolution of the work piece will cause one point on the periphery apparently to stand still in front of an indicating pointer. If numerals are placed on the work piece, the numeral which apparently stands still in front of the pointer will indicate the radial plane in which the unbalance correction should be made.

With two such electrical systems (one for each end) the amount and location of unbalance in any two selected correction planes can be accurately determined in practical correction units and the indications in each plane will be true and entirely free from the ef-

fect of unbalance corrections required in the other plane.

Because of the simple mechanical structure and the extreme flexibility of the electrical system used in the Dynetric Balancer, it may be arranged so that parts may be balanced while rotating about either a vertical or horizontal axis as may be required for the work in question. Further, it is not essential that the planes of correction be between the supporting bearings or that the weight of the work piece be concentrated between the supporting bearings. Further, the pick-up coil arrangement may be used as a runout indicating device. This application has been made to permit determining correction weights to apply to a floating or "self-balancing" type of cream separator bowl. In this type of part, which has an operating speed of 10,000 r.p.m., the part is supported on a spherical seat at the upper end of a vertical driving spindle. The upper end of the spindle is also provided with a suitable key for driving the separator bowl. The bowl actually "floats" on the spherical seat and the center of gravity of the bowl is at or near the center of the spherical seat. In balancing such a part, it is necessary to keep the upper or milk inlet end of the bowl running true to prevent splashing of the milk. Correction weights are applied to the bowl to make the milk inlet end run true. The amount of runout of an uncorrected bowl is actually measured in correction units by the attachment of a Dynetric Balancer pick-up coil to a dead center plug in the milk inlet end of the separator bowl.

The extreme flexibility of the electrical system of the Dynetric Balancer also permits measuring and locating pure static (force) or pure dynamic (moment) unbalance. When the machine is set up to give these indications, the "Left" "Right" lever of Figure 16 is moved to measure "Static" or "Dynamic" unbalance. "Amount" and "Angle" are determined in the manner previously described.

This balancing procedure is useful in measuring and locating unbalance corrections on automotive type fans, small high speed (12,000 to 20,000 r.p.m.) mo-

JARVIS

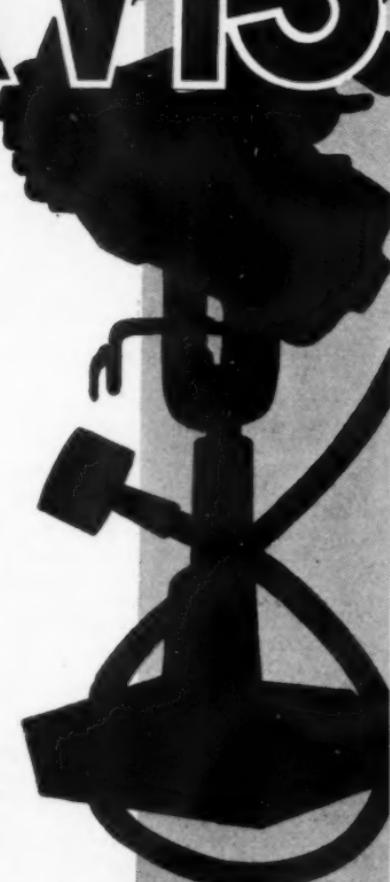
FLEXIBLE SHAFT POWER DRIVEN MACHINERY

For increased production — better finishes at minimum cost and nominal installation expense, Jarvis-built flexible shaft tools and machines prove their supremacy for grinding, drum and disc sanding, snagging, filing, wire brushing, buffing, polishing and cleaning operations on all metals and compositions.

*Write today for catalog—
Learn how to save.*

The CHAS. L. JARVIS Co.
MIDDLETOWN
CHICAGO OFFICE AND STOCK

CONNECTICUT
1344 W. WASHINGTON BLVD.



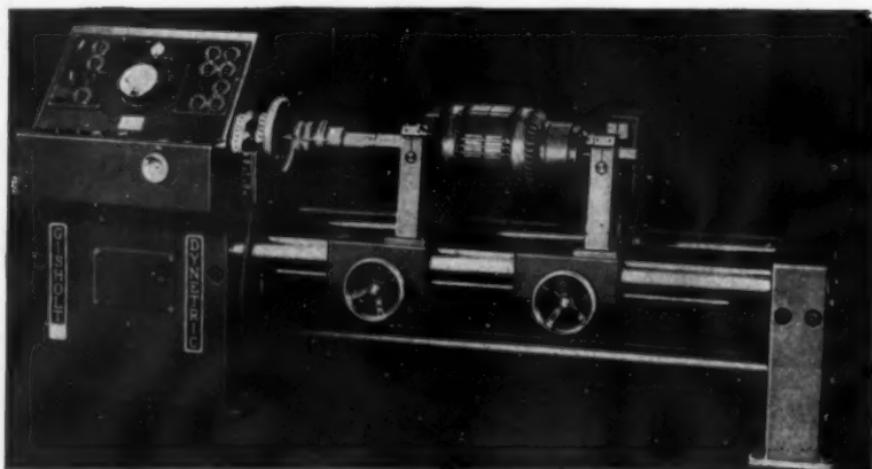


Fig. 22—Type "U" balancing machine, set up for balancing large electric motor armatures.

tor armatures and other parts where an extremely accurate static balance is required and where only a small percentage of parts will actually require a dynamic correction.

The stroboscopic lamp used with the machine just described requires that the part be rotated at speeds in excess of 600 r.p.m. if the operator is not to be disturbed by a discernible flickering of the lamp. Therefore, another type of machine has been developed for balancing parts at low speeds. It may be desirable to balance parts such as large armatures at low speeds because of the time required to accelerate and stop such parts. Other parts, such as large ventilating fans, normally operate at low speeds and lack sufficient strength for operation at higher speeds. The machine developed for such work is called the Gisholt Type U Dynetric Balancing Machine.

This unit, shown in Figure 22, is set up for balancing a large electric motor armature. In this type of machine, the work is supported in half bearings carried by a light supporting structure similar to that previously described and shown in Figure 13. Of course, for this larger, heavier work the support-

ing structure must be made of suitable strength for the work. The vibrations of the work-supporting structure due to an unbalanced part rotating in the supporting bearings is transmitted to coils in the field of permanent magnets in the same manner as described previously for the Type S machine. A system of electrical levers, and an amplifying device similar to that shown diagrammatically in Figure 21, are also provided in this machine to permit of measuring corrections in each of two selected planes without interference of the correction in one plane to the other plane.

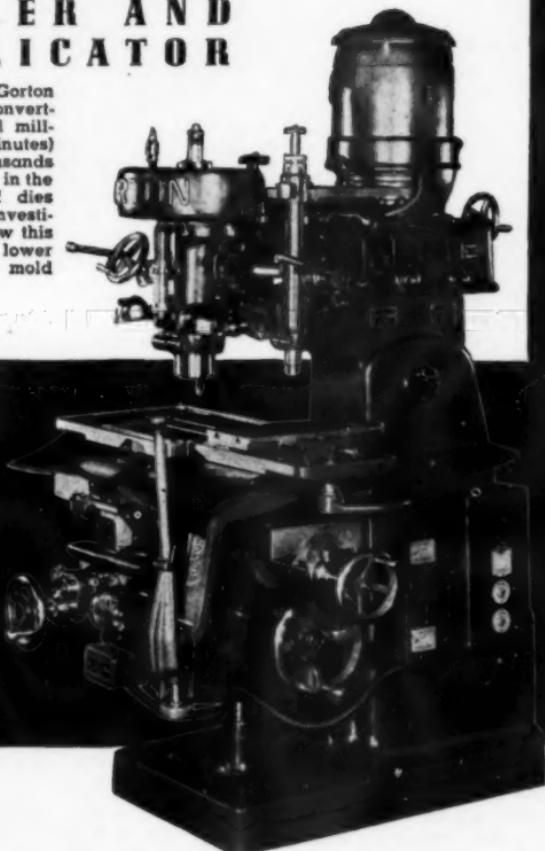
As this machine permits of balancing at speeds as low as 200 revolutions per minute, angular indication cannot be obtained by means of the stroboscopic lamp as previously described. The type U Dynetric Balancing Machine uses a wattmeter as a means for determining the angular location of the unbalance. The current coil of this wattmeter is supplied from a two pole sinewave generator which is rotated at the same speed as the work itself is rotated. This sinewave generator has a rotor carrying a permanent magnet and the generator windings are in the stator.

GORTON

SUPER SPEED

MILLER AND DUPLICATOR

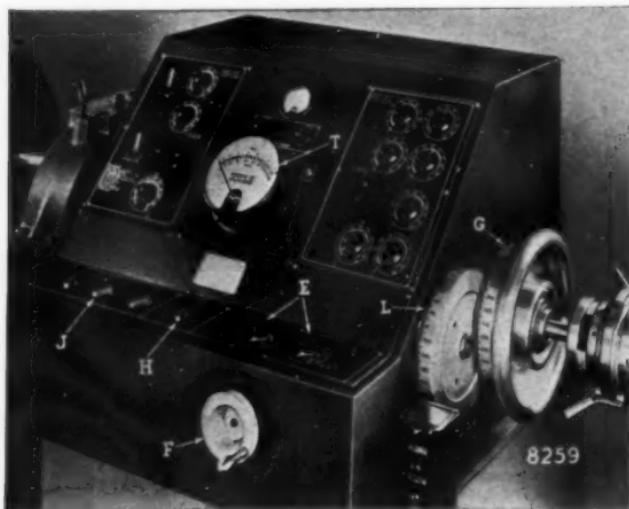
The use of Gorton Duplicators (converted into vertical mills in a few minutes) is saving thousands of dollars daily in the reproduction of dies and molds. Investigate and see how this machine can lower your die and mold costs.



FOR COMPLETE DATA, WRITE TO:

GEORGE GORTON MACHINE CO.
1115 13TH STREET, RACINE, WISCONSIN, U. S. A.

Fig. 23—Control and indicating panel of the Type "U" machine shown in Fig. 22.



With the work piece rotating, the position of the stator may be changed by means of the hand wheel "F" (Figure 23) so as to change the phase location of the generated voltage with respect to a radial plane through a fixed or zero degree position in the work piece. In this manner, the generated voltage supplied to the current coil in the wattmeter may be changed in phase with respect to an angular measuring point on the work.

The voltage coil of the wattmeter is supplied from the electrical system associated with the pick-up coils attached to the vibrating work supporting structure. Obviously, the wattmeter will measure and read the product of the electrical system's amplified voltage times the current supplied from the generator times the cosine of the phase angle between the voltage and the current. Now, if the hand wheel "F" can be adjusted so as to make the phase angle 90°, the wattmeter will read zero because the cosine of the phase angle is zero. This provides a means whereby angular indications of unbalance may be obtained. This setting for 90° phase location is a very critical one, and therefore permits of very accurate indications of the angular location of the unbalance.

Now, if the current coil of the wattmeter can be supplied from a coil in the sinewave generator which is 90° out of phase with the coil, previously described, the wattmeter can be used as a means of measuring amount of unbalance. The amount of unbalance as indicated on the wattmeter again can be arranged to be in "practical" units just as was used on the Type S Dynetric Machine.

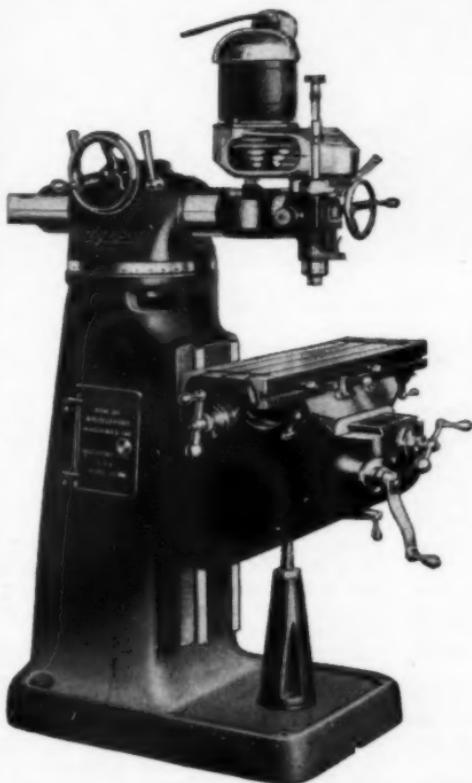
The operator's control panel of the Type U Dynetric Machine carries a switch "J" marked "Angle—Amount" and also carries a switch "H" which reads "Left—Right." The operating procedure is as follows:

With the control switch "H" set at "Left" and switch "J" at "Angle," turn dial "F" until meter "T" reads zero. Dial "L" then indicates the angular location of the unbalance in the left correction plane. Throw switch "J" to "Amount" and turn dial "E" until meter "T" reads zero. Dial "E" then records the amount of unbalance correction to be applied in the left plane. Then throw switch "H" to "Right" and switch "J" to "Angle," and turn dial "F" until meter "T" reads zero. Dial "L" then indicates the angular location of the unbalance in the right-

Bridgeport

TURRET MILLING MACHINE

Versatility — Rigidity — Unparalleled Range



A few of the advanced modern features that assure this needed accuracy are: Flexibility, Rigidity, Unparalleled Range and Versatility.

Angular settings in one plane are achieved by turning the hand wheel which controls the keyed overarm. Turret diameter is 15" with 5" overarm.

Column, knee and table construction are rugged with wide ways and taper gibbs for accurate and vibrationless operation. Table, knee and saddle locks are located in front for easy accessibility.

Graduated dials are 3½" in diameter. Anti-friction bearings are used throughout.

For additional information and prices on this time and money saver, write to

BRIDGEPORT MACHINES, INC.
52 REMER STREET • • • BRIDGEPORT, CONN.

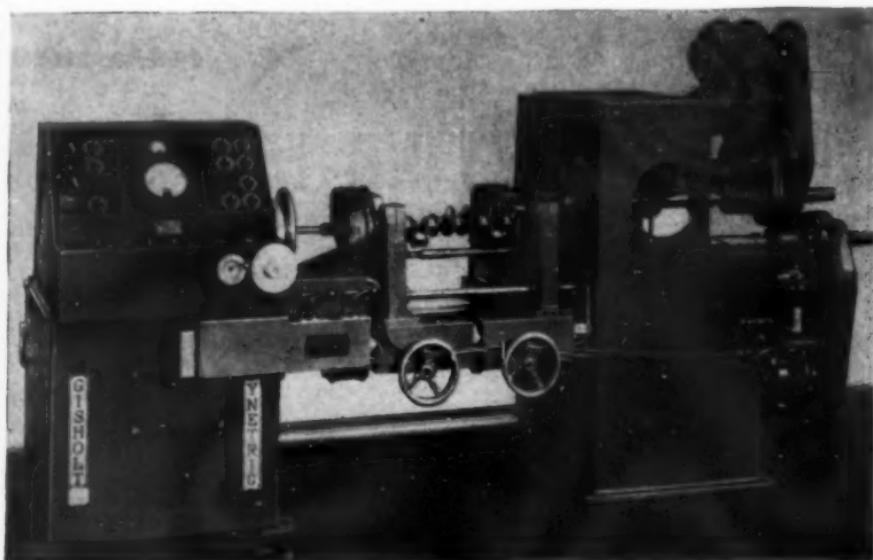


Fig. 24—Special arrangement of the Type "U" balances by means of which crank-shaft assemblies are measured, corrected and inspected for balancing in a single handling.

hand correction plane. Throw switch "J" to "Amount" and turn dial "E" until meter "T" reads zero. Dial "E" then records the amount of unbalance correction to be applied in the right plane.

Now, to locate actually the angular position of the unbalance in the work, the driving spindle "G" and the work are turned until the angular locations determined are indicated on dial "G" in line with the pointer associated with this dial. Then, the radial plane of the unbalance is directly in front of pointers attached to the work carriages.

The weighing dials "E" are simply a means whereby a voltage opposing the amplified pick-up voltage may be introduced into the system so as to give a zero meter reading and thereby provide a means for actual recording of the amount of unbalance in each end of the shaft or work piece. These dials also serve a further purpose which will be described later. Again, it is possible to so calibrate these dials as to represent correction required in "practical" units.

In this type of machine, the work is driven from the left-hand end by means of a driving shaft which carries two universal couplings, which are so designed as to offer a negligible resistance to the vibration of the work piece. One of these flexible couplings is attached to the machine spindle and the other, to one end of the work piece. The machine spindle is rotated by a suitable driving motor which carries a four step vee belt pulley. This means four possible speeds of work rotations are generally provided.

The unique arrangement of the Type U Dynetric Balancing Machine makes it possible actually to set from the dials "E" a suitable type of correction device. For example, in Figure 24 is shown a special arrangement of the Type U Dynetric Balancer by means of which an assembly of crank-shaft, flywheel, clutch, and vibration damper are measured, corrected, and inspected for balancing in one handling. The drilling machine for removing metal from the flywheel and belt pulley is mounted on the right hand end of the machine and the depth



Ettco

DRILL CHUCKS

KEYLESS—No key is needed, although holes are provided for a straight pin for universal use.

HAND OPERATED — Drill is placed by hand only. It tightens and centers itself by action of drilling.

SELF-TIGHTENING — A cone-shaped screw directly actuates three gripping jaws. Jaws are keyed in body—screw does not take jaw torsional strain — it only moves them up and down. *This is the reason for the 20 years' successful use of Ettco Chucks.*

Write for complete details.

ETTCO TOOL CO.

594 JOHNSON AVE., BROOKLYN, N. Y.

Also CHICAGO and DETROIT

to which drills will enter the work for correction is actually set from the weighing dials "E" of Figure 23. This is accomplished by means of position motors attached to each of the dials "E" which in turn are electrically connected to position motors carrying suitable depth cams mounted on the drill spindle. In this manner, by turning the left hand dial "E," a depth cam is actually set in the lower drill spindle so that this spindle can drill only to such depth as is required to make the correction in the flywheel end of the assembly.

An interesting extension of the fundamentals of the Type U Dynetric Balancing Machine with automatically controlled correction devices is the Type C crankshaft balancing and correcting machine shown in Figure 25. The arrangement shown is set up for measuring and correcting the unbalance in a four throw crankshaft. The four throw crankshaft has lugs on each side of No. 1 and No. 4 crankpins where metal may be removed by drilling to provide for balancing correction.

The ideal arrangement of a balancing and correcting machine would be one

in which four direct indications of unbalance could be determined on a balancing machine and these determinations automatically transferred to each of four suitably positioned correcting drills so as to permit each drill to remove only such amount of metal as will produce balance in the work. The Gisholt Type C crankshaft balancing and correcting machine actually makes this possible.

The operating procedure by which these four determinations are obtained is very simple and rapid. The crankshaft is placed in the balancing machine in plain half bearings which correspond to the regular bearing liners in the motor blocks. The coupling to drive the work is then connected and the machine is started by a push-button, which starts the work rotating.

With the work rotating in the balancing machine, the four-position selector switch "S" at the left-hand side of the cabinet (Figure 26) is moved to the first or "A" position, and the first knob, marked A', is turned clockwise until the indicating needle on the meter reads zero. The four-position switch is then moved to the next,

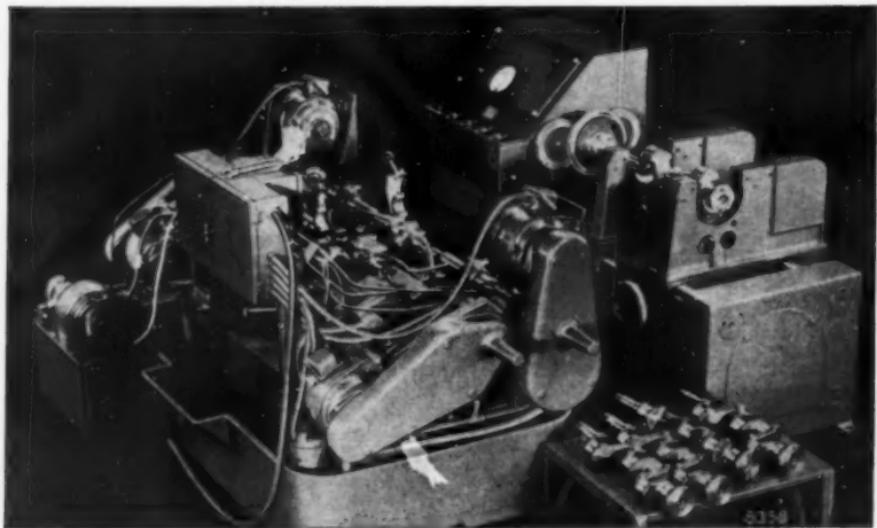


Fig. 25—Equipment for measuring and correcting unbalance in four throw crankshafts.

RIGHT IN THE GROOVE

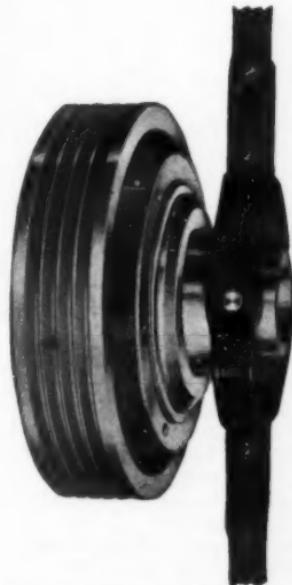
The Conway Clutch Sheave is just another able bodied application of the versatile and splendid Conway Disc Clutch.

Conway Clutches are kept abreast of the improvements in industrial drives, and are always in step with the trend of modern machinery design towards higher speeds and lighter weight per horsepower capacity.

Conway meets the new stress factors with sturdy steel plates that withstand sudden torque—husky actuating levers—rugged carriers—Oh, there's so much to say about

The last word in friction clutches.

Have you Conway Bulletins P-24, L-28 and XYZ-L on Disc Clutches, S-10—Overload Release and Slip Clutches, —No. 36-A Compression Clutches—K-32—One Revolution Clutches, E-8—Expansion Clutches?



THE CONWAY CLUTCH CO.

1541 Queen City Ave.

Cincinnati, Ohio

Fig. 26—Closeup of the controls used on the set up shown in Fig. 25.



or "B" position, and knob on dial B similarly adjusted; and the same procedure is repeated for "C" and "D" and C' and D', after which the machine is then stopped by the push-button.

Each dial setting on the balancing machine is electrically transferred to the proper spindle of the automatic four-spindle drilling machine. When the crankshaft is taken from the balancing machine and placed in the drilling machine, the depth to which each spindle will drill corresponds to the in-

dicated unbalance corrections which must be applied.

Moving a single starting lever on the drilling machine causes the drill spindles to rapid-traverse up close to the work. The spindles then continue to advance at the feed rate. As the drills touch the work, they begin to measure the depths which were transferred from the balancing machine. As each drill reaches its set depth, it is automatically retracted. This method reduces the possibility of human error.

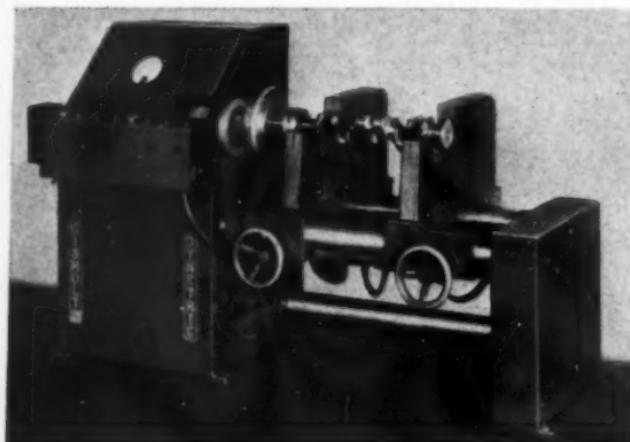
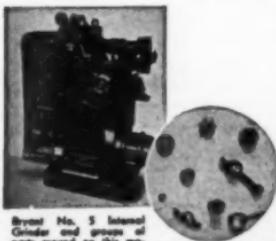


Fig. 27—Setup for balancing six throw crankshaft.

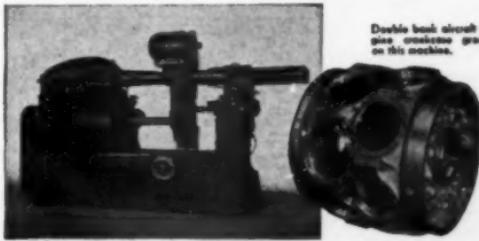
Very Small
OR
Very Large

GRIND THEM ON A BRYANT

THE Bryant line of Internal Grinders is suitable for grinding each size bore that may be required by the manufacturer's design. Any of these machines will produce finish and accuracy to satisfy every need. Straight and taper holes may be ground with standard equipment either separately or in combination with each other. Standard machines may be easily arranged to grind cams and out-of-round holes by adding the cam attachment.



Bryant No. 5 Internal Grinder and a group of parts ground on this machine.



Double crank aircraft engine crankcase ground on this machine.

BRYANT CHUCKING GRINDER CO., Springfield, Vt.

FORWARD with FEDERAL



Federal Presses will enable you to march forward. To meet those rising production schedules. To obtain "peak" output. This is why we say "Forward with Federal". Built to give you maximum service with minimum upkeep. Whether you are engaged in the actual defense program or not, you always have need for a "good" press. Federal Presses are now being used throughout the country on important government orders.

Let us show you our complete line of presses before you buy. Inquire today.

FEDERAL PRESS CO.
ELKHART

..

INDIANA

While one crankshaft is being corrected, the operator can measure the unbalance in another crankshaft. A single operator can measure and correct for unbalance approximately 30 to 40 crankshafts per hour.

For six throw crankshafts, a balancing machine is provided with six weighing dials, essentially one for each crankpin (See Figure 27). Each of these dials may be corrected to its individual spindle of a six spindle automatic driller. A process similar to that just described is used in measuring and applying corrections.

By means of the various newer types of balancing machines herein described it is now possible to balance virtually every type of part in which unbalance is objectionable. Armatures weighing from one ounce to 6000 pounds have been accurately balanced to give vibrationless, trouble-free operation. Grinding wheels, cream separator bowls, rayon machinery parts, and a host of other rotating elements are being balanced by production methods with these newer types of equipment. Every industry has its vibration problems which can be eliminated or reduced by means of the new designs of balancing machines at an extremely

1941 A. S. T. E. Show Reservations

Applications for reservations for the 1941 Machine & Tool Progress Exhibition are now in the mails to exhibitors at the two previous shows (in 1938 and 1939), according to an announcement by Ford R. Lamb, Executive Secretary, American Society of Tool Engineers, sponsors of the show.

To be held in conjunction with the 1941 annual convention of the A. S. T. E., the week of March 24th, the exhibition will be devoted to displays of new equipment and methods designed to expedite production, particularly from a national defense standpoint.

The exhibit committee for 1941 is composed of Frank A. Shuler, Chrysler Corp., Chairman; Frank R. Crone, Lincoln Motor Co.; William R. Smila, Chrysler Corp.; and Luke E. Beach, General Motors Corp.

atlas ANNOUNCES
NEW
**MULTIPLE SPINDLE
DRILLING
MACHINES**

2, 3, and 4 SPINDLES
4-BEARING
"Floating Spindle" Heads
New Head Control
Mechanism
Massive Table Construction
Assures Rigidity

TWO OTHER TIMELY
atlas TOOLS



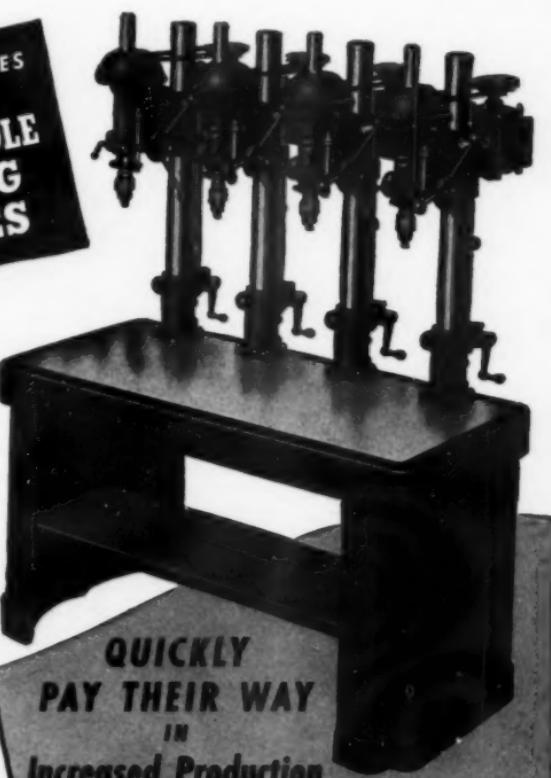
NEW BENCH
MILLING
MACHINE

Handles full range of milling work. Table working surface 4½" x 18" (hand) or 10" (Atlas "Change-O-Matic" feed). Cross travel 12". 3½" vertical 6". Prices \$175 to \$195 less motor and arbor.

7" SHAPER

Handles with speed and precision everything from 1/8" to 7" stroke. Crank type ram-driving mechanism, complete V-belt drive, 4 speeds, 3 automatic cross feeds. Operates from 1/2 HP motor. Price \$285 less motor.

QUALITY SHOP EQUIPMENT SINCE 1911



QUICKLY
PAY THEIR WAY
IN
Increased Production

Saving motion — re-jigging, reaching, stacking — saving power and set-up time — increases production and reduces costs on drilling and tapping operations with these new Atlas Multiple Spindle Drilling Machines.

Drilling heads have the famous Atlas SKF-equipped floating-drive spindle design with new Atlas head positioning mechanism. Table is precision ground for accurate work with jigs. Prices are \$195, \$310, and \$350 less motors (1/3 or 1/2 HP). Available with Jacobs 0-1/2" chucks or No. 1 Morse taper spindles. Ask your dealer and send for new 1941 catalog with complete details.

ATLAS PRESS COMPANY

1250 N. PITCHER ST., KALAMAZOO, MICH.
NEW YORK CHICAGO PHILADELPHIA
130 W. 42nd ST. 35 E. Wacker at Wabash 113 N. Third St.

Harding^e ELGIN



Precision **BENCH LATHES**

ELGIN TOOL WORKS

Division Of HARDINGE MANUFACTURING CO.
1772 BERTEAU AT RAVENSWOOD AVE. - CHICAGO, ILL.

Lubricating the Modern Machine Tool

(PART II)

By A. F. BREWER, M. E.

IN THE November issue, we considered the lubrication requirements of a number of types of machine tools. In the following, we shall see how the makers have provided for lubrication of additional types of tools.

Drilling Machines

The tapping and drilling of relatively small holes, along with reaming or counterboring, either singly or in multiple, is done by drills of vertical, radial, horizontal, or multiple-spindle type. High speeds are advantageous in such work.

Lubrication Details

High speeds and maximum production, however, are only possible provided the working parts of the drill function absolutely in unison with respect to one another.

Centralized automatic lubrication has been developed to assist in attaining this objective. The essential purpose, of course, is to insure a sufficient supply of lubricant to all wearing parts of the drill. This should be borne in mind, irrespective of the design of the equipment or the means provided for rendering it automatic. The system, however, should never be so complicated as to involve difficulty in repair, or abnormal possibility of breakdown. Centralized automatic lubrication also enables the use of one grade of oil, thereby eliminating storage problems and the possibility of difficulty due to application of the wrong product at any time.

In connection with gearing, however, as with boring mills and other machine tools, there are, of course, some cases where these mechanisms will be designed for individual or separate lubrication. Naturally, bath or splash oiling is preferable, and, in such instances, the same products theretofore specified under boring mills would be suitable.

Exposed gearing or other toothed mechanisms running perhaps in non-oil tight casings, on the other hand, will require a heavier product which will maintain an effective lubricating film on the teeth, notwithstanding any action of centrifugal force which may be prevalent.

Other Types of Machine Tools

There are, of course, a number of other types of machine tools used for more specific service. We have in mind the grinder, screw machine and thread cutter, the hobbing machine, and chucking machine, etc. While to an extent more limited in application than the more massive tools already discussed, they cannot justly be classified as auxiliaries, even though they may amount to this in many shops. Their functions are distinctive, and quite as important in finishing certain types of work as their heavier-duty counterparts.

The principles of operation will be much the same, i.e., the working of the material into suitable shape and design for subsequent use as tools or machine parts. This is brought about by cutting, as in the gear-hobber, or by grinding-

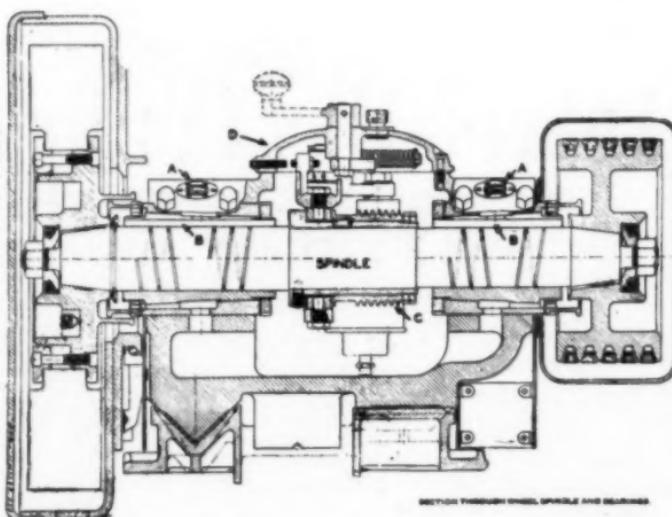


Fig. 11—Norton grinder wheel spindle unit assembly. The spindle runs in bronze bearings "B" which are tapered on their outer diameter and drawn into cast iron cases. Lubrication is maintained by a small pump driven by worm "C" on spindle. This pumps spindle lubricant from reservoir in wheel-slide through an external filter and thence to each bearing. Lubricant flow is observed through sight window "A" above each bearing. It can be regulated by an adjacent cock. The same lubricating system serves the end thrust, the worm drive and reciprocating parts by direct application through flexible tubing (to the end thrust parts) or by spray deflected from housing cover "D."

Kerosene is successfully used for lubricating this entire mechanism. Important factors in the maintenance of low viscosity lubrication are well flushed bearing surfaces, proper bearing adjustment, and provision for taking complete advantage of the cooling ability of the lubricant. In the Norton assembly, all parts are protected by lubrication at temperatures which rarely exceed 120 degrees F.

ing, as in the grinder. In consequence, such equipment will function by virtue of suitably arranged gearing, bearings for the rotating members, and guides or slides for such parts as may be reciprocating in their motion. The grinding machine is a distinct adjunct to lubrication, for today the perfection of bearing surfaces is being given most careful attention. So carefully are grinder spindles and bearings prepared, that they themselves are being satisfactorily lubricated by very low viscosity lubricants such as kerosene.

Lubrication Procedure

Elsewhere lubrication will, therefore, differ but little from that already discussed. While the use of independent oil and grease cups will often be the most economical and satisfactory equipment, automatic or flood lubrication is also provided for by certain builders. It all depends on the design, the speed at which the machine is to operate, and

the bearing or frictional pressures which may be involved.

In consequence, the same varieties of lubricants as recommended elsewhere in this article will, in general, be applicable to similar wearing parts on these machines. For example, in splash or force feed lubricating systems, a 300 to 500 viscosity machine oil should be used. For grease lubricating systems, a grade of grease should be used which, under the operating temperatures involved, will function with minimum leakage. It should also resist chemical breakdown and oil separation.

Methods of Lubrication

Broadly speaking, bearing lubrication in machine tools is a matter of oil or grease lubrication. These two classifications can be further subdivided, according to the method employed for handling the lubricants. Oil, for example, is applied by continuous circulation under pressure, or in measured

ARMOR PLATE or MATCH PLATE ... it's all the same to a DoAll



FIRST AID TO OUR DEFENSE PROGRAM

Top illustration shows a DoAll cutting out holes on flask dowels in aluminum match plate for metal patterns. In the circle armor plate is being cut at the rate of 40 square inches per hour.

FASTEST PRECISION METHOD

For cutting internal and external shapes from any metal up to 10" thick. DoAll replaces shaping, milling and lathe work with enormous savings of time, labor and material.

Let a factory trained man bring a DoAll to your plant and show you what it can save you.

FREE—Handbook on Contour Machining, 158 Pages of valuable metal working helps.

CONTINENTAL MACHINES, INC.
1300 S. Washington Ave., Minneapolis Minn.



In designing DoAll Defense Tools, DoAll engineers use this big board with drafting machine on an overhead crane.

quantities by the mechanical force feed oiler, or a centralized pressure system. Grease, in turn, by pressure gun, grease cup, or a centralized pressure device.

The Mechanical Force Feed Lubricator

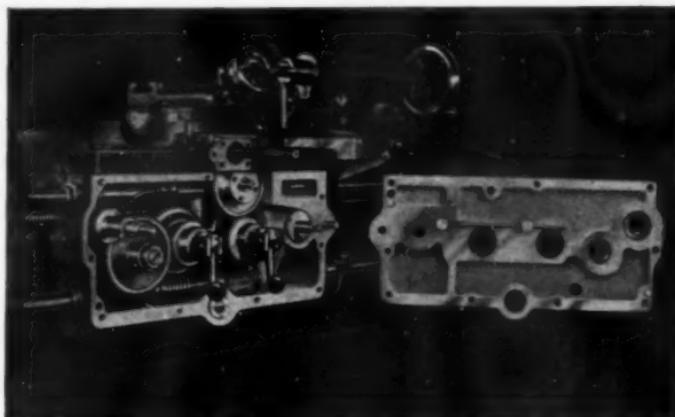
This mechanism is the simplest of the measured oiling devices. It can be readily driven by the machinery which it serves; it can be made to function only when the latter is in operation, and then only at a proportional speed. In other words, the higher the speed of operation, the more oil will be delivered. The pumping capacity and rate of oil flow is, therefore, variable. As a result, such a lubricator will auto-

hand, this will depend upon the extent of operation, the number of oil feeds, and the rate of delivery. This latter must be worked out in actual practice, according to the requirements of the bearings and the viscosity of the oil being used.

Effect of Operating Pressures

In the selection of virtually any means of pressure lubrication, it is important to have at least an approximate idea as to the operating pressures which will prevail at the various bearings. This is especially true in the case of mechanical force feed oilers. Where circulating flood lubrication is involved,

Fig. 12 — Positive oiling on the Pratt & Whitney Model "C" lathe is provided for the carriage ways and bearings within the apron.



matically start or stop with the machine to which it is attached.

Mechanical lubricators have been very successfully applied to a wide variety of machine tools where it is practicable to drive the lubricator by direct connection from some external moving part. This can be brought about by a link mechanism, an eccentric located on some rotating element, through belt connection from the machine itself, or by the use of an electric motor and speed reduction mechanism.

The use of a mechanical force feed lubricator for certain types of large machines may be limited, however, in that the capacity is oftentimes comparatively small in contrast with a flood circulating system, hence requiring more frequent filling. On the other

volume in company with the pump pressure can be depended upon to maintain the necessary lubricating film between the wearing elements. With the mechanical force feed oiler, on the other hand, pressure alone is involved. The volume is limited; pump pressure should, therefore, not vary to any wide degree, nor should the lubricator be allowed to run dry; otherwise, lubrication would cease in a comparatively short time.

Centralized Pressure Lubrication

Another interesting phase in connection with pressure lubrication has been the development of a means of centralized lubrication which functions by virtue of a central control, all wearing parts so served being flushed and sup-

Present Yourself With This Gift



A gift that will be long remembered—a gift that will pay for itself many times over—a gift that your employees will also enjoy. The answer is Berkeley Modern Motor Drives.

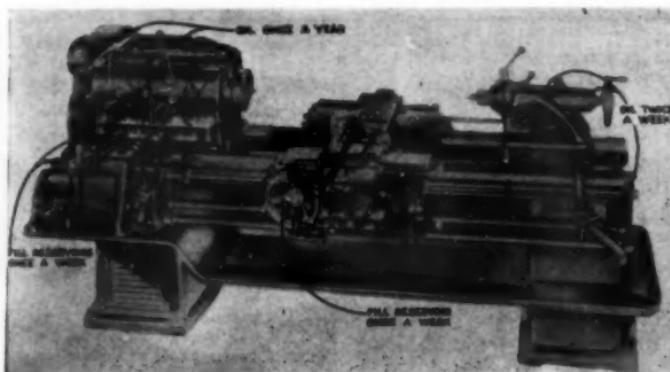
When your Machine Tools are equipped with these flexible, efficient drives, production gains will soon increase profits, and your gift will be a good investment. These modern drives will assure maximum production by providing just the right speed for the job, under finger-tip control. Berkeley provides a sturdy, dependable drive for every machine tool need, designed and constructed specifically for your requirements by specialists in this field.

You will be repaid many times over for investigating Berkeley Drives.

Write today. No obligation.

The Berkeley Equipment Co.
CORY
PENNSYLVANIA

Fig. 13—Monarch lathe with details of the automatic force feed lubricating system by which oil is delivered in metered quantities to all moving parts. Only 14 points require oiling by this system.



plied automatically with oil from a central reservoir. By locating this latter adjacent to the machine to be lubricated within ready reach of the operator, and equipping it with a suitable plunger which operates the pump, a lubrication of all parts connected thereto becomes but a matter of operating the discharge mechanism. Common practice on new designs is to build the lubricating unit right into the machine. This method of lubrication is well adapted to lathe aprons and milling machine saddles. In such a system the amount of lubricant fed is restricted to as nearly as possible the theoretical lubricating requirements of the respective bearings.

Since certain bearings will vary from

others in regard to their oil requirements, it is necessary to provide for some arrangement of regulation or control of flow. So the oil is measured by drops. This is accomplished either by proper individual construction of the drip plugs, which, on such equipment, are also known as control outlets; by use of a control device located at the base of the pump, or by the installation of suitable adjusting manifolds at salient points in the system.

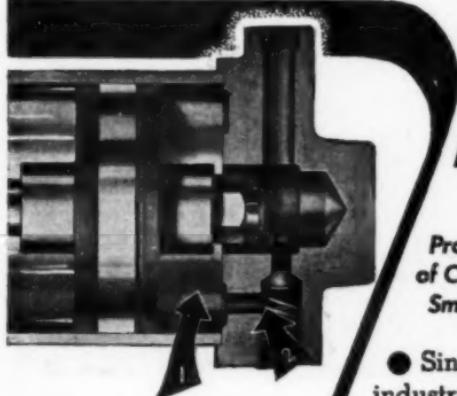
Properly installed, such systems are claimed to be relatively fool-proof, exceedingly simple to operate, and an insurance that clean oil will be delivered to the respective bearings. All parts, however, must be durable and capable of withstanding jars, shocks, and temperature fluctuations.

To insure that clean oil is used, suitable filtering media, such as a felt pad or screen, are employed which will normally effectively remove any foreign matter that may have entered the oil in the course of storage or handling prior to usage.

Pulsating Control

By use of the principles of pulsation and a suitable pressure control valve to regulate the oil flow, the necessity for manual operation can be done away with. The lubricator itself is driven by belt or gear connection from any rotating part of the machine to be served. This is a benefit where an extensive number of bearings are to be served, for the entirely automatic feature eliminates the possible factor of

NOPAK Self-Regulating



CUSHIONED AIR CYLINDERS

Meet Most Operating Requirements

Provide desirable features of Constant Cushioning with Smooth Gradual Action.

- Since their introduction late in 1939, industry has found more uses for the new NOPAK Air Cylinders with Self-Regulating Air Cushion than for the two earlier types combined. Here are a few reasons why: 1. The smooth, gradual, pre-determined cushioning action remains constant. 2. There is no needle valve to be frequently re-adjusted, clog-up, or get out of order. 3. Eliminate damaging metal-to-metal impact, noise, shock and vibration. 4. They place *Cushioned Air Cylinders* in the non-cushioned price range. 5. Prolong cylinder life—cut maintenance costs way down. You, too, may find that this new type cylinder will fulfill most of your needs.



GALLAND-HENNING MFG. CO.
2754 S. 31st Street • Milwaukee, Wisconsin

Consider All 3 Types—they're fully described and illustrated in Bulletin 77. If you haven't a copy, send for it.

NOPAK VALVES and CYLINDERS

DESIGNED for AIR or HYDRAULIC SERVICE

Fig. 14 — Turret lathe lubrication is developed by Warner & Swasey by pressure pump circulation of oil.

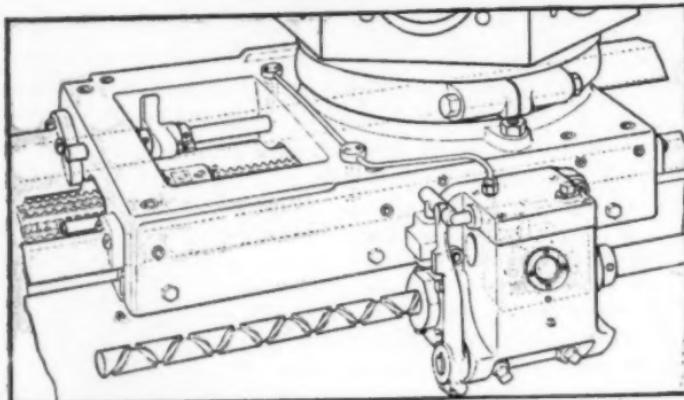
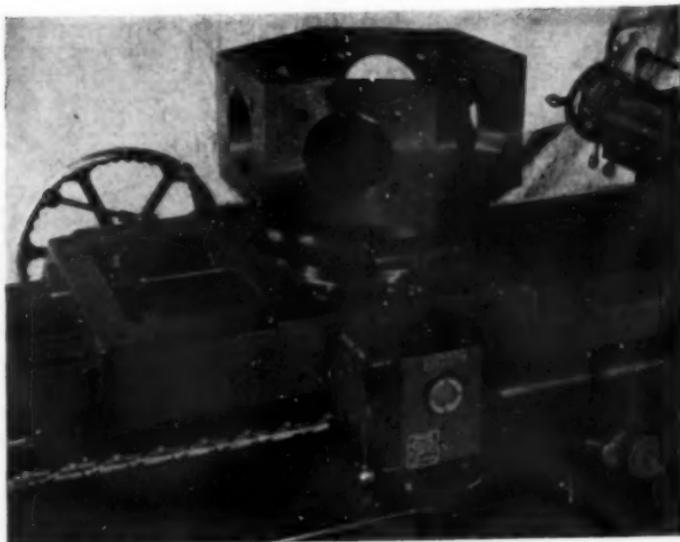


Fig. 14-A—Details of Warner & Swasey pressure lubrication system. A built-in oil reservoir with suitable oil leads therefrom, supplies lubrication for the ways.

human error; the only alteration required occurs when the oil reservoir is to be filled or any individual feeder adjusted.

In such a system, the oil is fed only during a pulsation or high pressure period in the cycle of pump operation, control being maintained by a suitable plate valve arrangement. An added feature is the practicability of flushing the entire system under the prevailing pressure at the high pressure period

by pressing down a suitable flushing button which is a part of the pump unit.

Continuous Lubrication

Continuous or flood lubrication involves a directly opposite theory to intermittent or measured lubrication, inasmuch as the bearings, etc., are literally flooded with an excess of oil. Here the oil acts not only as a lubricant, but also as a cooling medium to



CENTRIFUGAL COOLANT PUMPS *and* BY-PASS OIL RELIEF VALVES

Fulflo pumps and valves are found on many of the countries leading Machine Tool Builder's equipment.

This equipment is in turn used to manufacture many famous products. Fulflo is proud of the part it has played in making these products the best of their kind.

Engineers throughout the country have found Fulflo pumps and valves built to meet their specifications, have added dependability, compactness, and economy to their equipment.

You, too, may secure this help. Investigate Fulflo's ability to serve you promptly and economically with centrifugal coolant pumps and hydraulic by-pass relief valves that really fit YOUR needs.

The **FULFLO SPECIALTIES CO., Inc.**
BLANCHESTER ••• OHIO



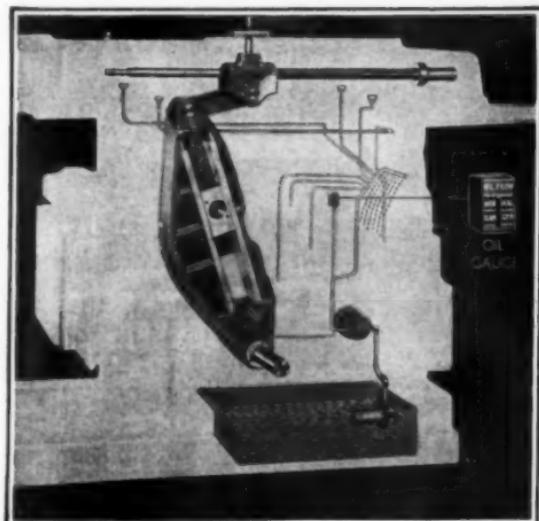
Symbol FVM
Vertical Type



Symbol FHM
Horizontal Type



Fig. 15—Oiling diagram of a Gould & Eberhardt shaper, showing relative location of the oil reservoir, pump and accessory piping, with oil flow indicated.



carry off any frictional heat that may be developed.

Flood lubrication also keeps the bearing surface free from dust, dirt, and metallic particles to reduce the tendency toward abnormal wear or scoring of the shaft or bearing. In certain installations, the oil from a continuous oiling system can be drained to some central point of collection from which it may be removed when desired, and filtered or centrifuged in order to effect purification.

Continuous oiling may be broadly grouped into two classifications, i. e.:

1. Splash lubrication
2. Force feed lubrication

Splash Systems

Splash lubrication in machine tool service is developed by gearing. It is adaptable where the crankcase or oil sump is completely enclosed and the entire system is oil tight. In general, splash systems have some provision installed for picking up the oil from the base of the machine and transmitt-

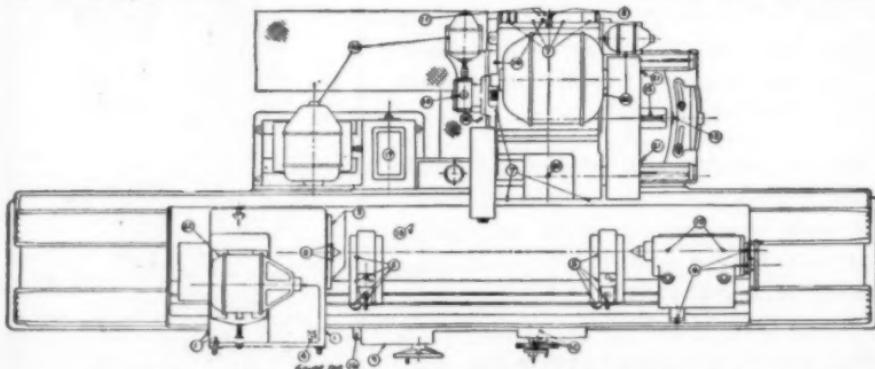


Fig. 16—Lubrication diagram for a Farrell-Birmingham work moving roll grinder. Points 1 to 9 represent pressure grease fittings; 10 to 13 are Bowen oilers. The other points provide for grease or oil application according to chart instructions.



**IT'S EASY
TO CUT
GRINDING
COSTS**

WITH *Mall* TRADE MARK FLEXIBLE SHAFT GRINDERS

Check These ECONOMIES

- ★ Cut Power Costs
- ★ Cut Labor Costs
- ★ Cut Production Time
- ★ Less Fatigue for Operator
- ★ Power Available in Any Position.

MALL flexible shaft machines will quickly demonstrate these major money saving advantages on any metal cleaning or finishing job. They are easily wheeled right up to the work—operate from any regular electric current outlet and eliminate the need for frequency changers and costly compressed air.



MALL 3524-D $\frac{3}{4}$ H. P. Grinder.
Other Models $\frac{1}{2}$ H. P. to 3 H. P.

A constant speed, aluminum frame, dust and vaporproof or ventilated type motor delivers a steady flow of power through the heavy duty flexible shafting to the working tool—thus placing 2 to 3 times the power in the operator's hands with a minimum of weight. The same power unit can be used for SANDING, WIRE BRUSHING, POLISHING, DRILLING and GRINDING due to the interchangeable attachment feature of these working tools. There's a MALL grinder for every job!

Write for illustrated circulars. We make over 200 gasoline engine, air and electric motor driven portable power tools, flexible shaft machines and attachments. If you have use for any type of power tool, consult us immediately. We can furnish tools that will definitely save you time, labor and money on all of your production jobs.

MALL TOOL COMPANY

7742 SOUTH CHICAGO AVENUE CHICAGO, ILLINOIS

ting or throwing it to the points to be lubricated.

In equipment lubricated by splash systems, a quick water and sediment separation is imperative. The viscosity of the oil in a splash system should, therefore, be as low as is consistent with requirements in order to insure rapid precipitation.

Few lubricants receive any harder service than those involved in systems of this type, since they are used over and over again, frequently without purifying or external cooling. As a result, the capacity of the reservoir should be sufficient to allow the oil a certain period of rest.

Pressure Circulating Systems

In a pressure circulating system, the oil is forced into the bearings at pressures ranging normally from 5 to 15 pounds per square inch. This may be obtained either by making use of the action of gravity or employing oil pumps, along with a simplified system of oil piping.

Where gravity is involved, suitable storage tanks are located at a sufficient elevation above the bearings to produce a head corresponding to the required pressure.

In oil pump installations, the oil is passed in a continuous cycle through the bearings, and then filtered and cooled, etc.

Lubricants used in such a system have their requirements controlled to a large extent by operating and constructural conditions. When the sys-

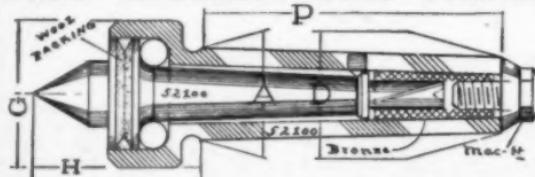
tem includes ample purifying and circulating capacities, the oil will be subject to comparatively light duty, inasmuch as bearings are continually washed out, and there is opportunity for dirt and water to precipitate. Also, as there is an adequate and continuous flow of lubricant, it will be generally unnecessary in such a case to select an oil capable of standing extreme temperatures or pressures. It is only necessary that the oil shall resist emulsification and be free from corrosive acids. Emulsification would clog the system, while acids would cause deterioration of the piping, filters, settling tanks, bearings, etc.

Ring and chain oilers are used to a certain extent in production service, and involve flood lubrication within the ability of the rings or chains to transmit the oil to the bearing. The same conditions hold for lubricants for this type of service, as have been mentioned under splash lubrication.

NOTE—A. F. Brewer, author of this article is Mechanical Engineer attached to the Technical and Research Division and Editor of the magazine "Lubrication" published by The Texas Company, 135 E. 42nd St., New York, N. Y., through whose courtesy this material has been supplied.

Illustrations were furnished through courtesy of Jones & Lamson Machine Co., The Bullard Co., Inc., Pratt & Whitney Division, Niles-Bement-Pond Co., Sundstrand Machine Tool Co., G. A. Gray Co., Kearney & Trecker Corp., R. K. LeBlond Machine Tool Co., Brown & Sharpe Mfg. Co., Fellows Gear Shaper Co., Cincinnati Milling Machine and Cincinnati Grinders, Inc., Norton Company, Monarch Machine Tool Co., Warner & Swasey Co., Gould & Eberhardt and Farrell-Birmingham Co., Inc.

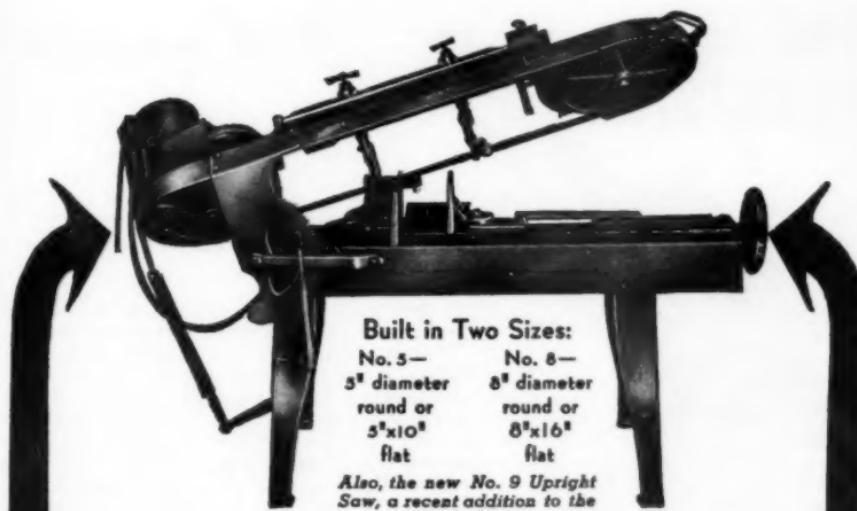
RIGID RESILIENT BULL CENTER



Rigid Tool Company, 2,000 Witherell St., Detroit, Michigan

A disappointed buyer is slow in paying for his disappointment; while we have never yet, lost a dollar, on a purchase order; or a customer that we know of; and seldom send out a "Please remit". But we are real cranky, about good work, and good material. The best is none too good. Excellence in Designing and Manufacturing is Excellence in Advertising.

All Morse tapers carried in stock.

**Built in Two Sizes:**

No. 5—	No. 8—
5" diameter	8" diameter
round or	round or
5"x10"	8"x16"
flat	flat

Also, the new No. 9 Upright Saw, a recent addition to the Wells line.

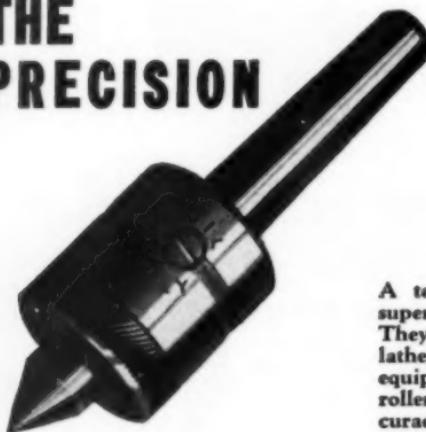
A "SPARK PLUG" For YOUR PLANT

HERE'S a pace-setting saw that will put a new spark of life into your production. For bars, sheets, tubes, angles—odd jobs, continuous production—the Wells Saw is a money-saving production booster. It's fast, accurate, portable, dependable, easy on blades and has features galore that you'll like and benefit from. Write today for complete imformation.

Three Rivers **WELLS MFG. CORP.** Michigan

WELLS *METAL CUTTING BAND* **SAWS**

THE PRECISION



Available in Taper
Shank, Slip-in, Slip-over
and Spindle Types.

"Center of Centers"

A test in your own plant will prove the superiority of these friction-less live centers. They are made for the smallest tool room lathes as well as the largest railroad shop equipment. Large taper thrust and annular roller bearings, precision mounted, assure accuracy and long life, even under the most severe conditions. Front bearing cone seats on resilient pad — a shock absorber that protects against tool breakage or spoilage of work. Send for bulletin giving full details.

The Utility Sleeve

A removable taper shank tool driver that cuts small tool costs (at least 40% — some customers report 75% savings).

*Check Items on
which you want
bulletins*

The Utility

Line

Floating Holders
Countersinks
Spot Facers
Sleeves
Live Centers
Counterbores
Core Drills
Reamers
*Pin to letterhead
and mail Now!*

Used with taps, drills, countersinks, reamers, end mills, center drills, counterbores, woodruff cutters, taper pin reamers, etc. The sleeve is a two jaw collet in action, fitting over the diameter of the shank of tool which is positively driven by flats or tang on shank end. Bulletin gives full details. Cheerfully sent on 30-days' free trial.



**Utility
Tools**

*Special bulletins
give full information
on Utility
Tools. Check the
ones in which you
are interested, pin
to letterhead and
mail.*

The J. C. GLENZER CO., Inc.
6465 Epworth Blvd.
DETROIT, MICH.

Welding Design

(PART II)

By R. A. GAST, Mechanical Engineer,

IN the November issue, the approximate or direct replacement method of designing for welding was discussed. We shall now consider the second, or conventional method. In this, some account is taken of load or service conditions and the members, joints, etc., are proportioned to the requirements, using established values for loading. The following practical examples illustrate this method:

Line of Bedplates:—Most bedplates are of a type which has a self-contained load, such as a motor-driven pump or motor-generator set.

A study is first made of the floor plans of the bedplates being used. These plans may be grouped into three general classes:

1—Symmetrical about two axes.
(See Fig. 1).

2—Symmetrical about one axis.
(See Fig. 2).

3—Not symmetrical. (See Fig. 3).
It is assumed that all three bases are

of the same height and about the same in cross-section. They should be studied to see whether or not certain sections may be used interchangeably.

For example: Section A, (Fig. 1), is of the same shape as A in Figs. 2 and 3, and sections B of Figs. 2 and 3 are the same in shape. If the bases are divided along the line as indicated, then all that would be needed to make any one of these bases or, in fact, any one of many kinds of bases, would be parts A and B. These can be assembled in any desired combination resulting in A-A base, B-B base, or A-B base with any desired variation or difference in center lines.

Then the base should be studied in relation to the holding down bolts. These should be laid out accurately as to plan and then the largest base necessary should be sketched in roughly, and see whether or not the smallest plan would fit on to the largest plan to an advantage, assuming, of course,

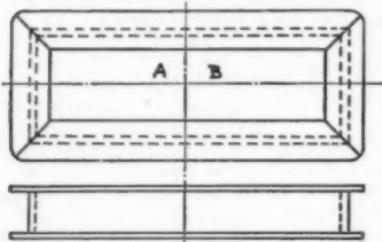


FIG. 1

Fig. 1—Example of bedplate symmetrical about both horizontal axes.

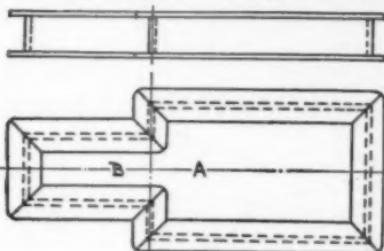


FIG. 2

Fig. 2—Example of bedplate symmetrical about one horizontal axis only.

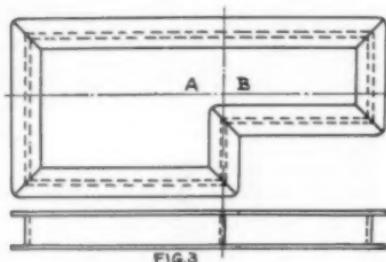


Fig. 3—Example of bedplate not symmetrical about either horizontal axis.

that the holding down bolts are in the center of a boss, which boss may be moved around to accommodate the required dimensions. All of this study indicates very clearly and definitely the flexibility of design made possible by welded fabrication. It reduces the number of stocked parts, resulting in lower inventory costs. Because of these advantages, this phase of the problem should be given a great deal of thought.

Next, study should be made of the relative heights of the support planes of the driving and driven units. In general, the distance A, (Fig. 4), from the support plane to foundation is not of extreme importance, but the difference in elevation B of the two planes is important. A base for a motor driving a pump, for example, must have the difference in elevation between the point of support of the motor and the point of support of the pump made

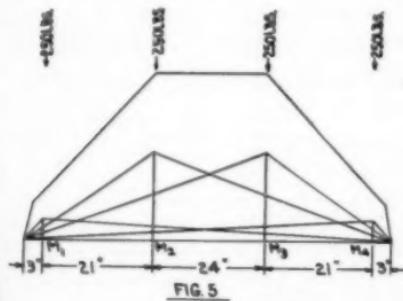


Fig. 5—Combined load and moment diagram for bedplate, Fig. 6.

rather accurately, whereas the distance from the motor support to the foundation is not of prime importance. These differences should be studied. In many cases, differences may be handled by special devices or a machined plate will serve.

After the general scheme has been laid out and the number of base sizes and dimensions have been generally set, consideration should then be given to the joining of the various parts.

The flexibility of this method, permitting quick delivery of standard or special bases is very advantageous, and the low cost, is most attractive.

Now having the size, shape and depth of base settled, methods of joining the parts determined and types of joints laid out, then the design can be started.

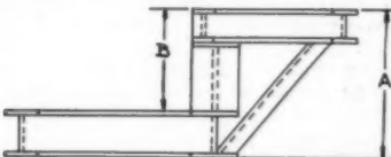


FIG. 4

Fig. 4—Example of bedplate having two elevations.

Design Procedure: — Illustrating the design of a simple bedplate, shown in Fig. 1, for arc welded steel construction, it is necessary that definite loads and limiting dimensions be assumed.

The loads are indicated in the accompanying diagram, Fig. 5. Approximate dimensions are shown in the preliminary plan, Fig. 6. The loads shown on diagram are for one side of the bedplate only and are for two machines (such as a pump and motor) weighing 1,000 lbs. each. After the loads have been determined, the next step is to lay out the location of the points of attachment, in plan, and also to check the overhang of machines involved so that the bedplate dimensions will be correct as to length and width insofar as clearance is concerned.

From the dimensions given in the load diagram, calculate the bending moments involved. One of the simplest ways to do this is to do it graph-



Investigate

"B-LINE" HEAVY DUTY BALL BEARING GRINDERS

Available in BOTH Pedestal and Bench Models, from $\frac{1}{4}$ to 5 H.P. . . . These Grinders are designed for High Capacity output, and strongly built for Hard Service . . Patented 6 Volt Bayonet Type Lamps that vibration will not work loose, combined with Spark Arresters over each Wheel . . Adjustable Tool Rests, and Safety Glass Eye-Shields . . meet all Safety Code Requirements . . Furnished with either Magnetic or Manual Type Off-and-On Switches . . . Send for Informative Bulletin No. 1003 Today.

THE BROWN-BROCKMEYER CO., Inc.
Leading Independent Motor Manufacturers — DAYTON, OHIO



*Write for specifications,
sizes and prices.*

A Scientific Spur to
fine performance

Norgren Sight Feed Air Line Lubricators automatically condition pneumatic tools (lubricate them while running) by injecting an accurately controlled oil fog into the air stream. Fully adjustable from zero to constant saturation, it saves oil, assures smooth, efficient operation. NO OTHER DEVICE WILL DO THIS JOB.

C. A. NORGEN CO., Inc.
214 Santa Fe Drive, Denver, Colo.

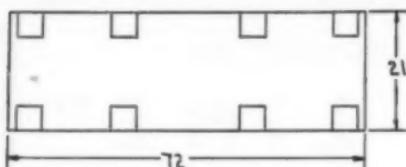


FIG. 6

Fig. 6—Preliminary plan of bedplate.

ically. This is indicated in the sketch. Disregarding the weight of the beam, the bending moments are shown in Fig. 5.

The subscripts indicate the location of the moments involved:

69

$$M_1 \text{ equals } 3 \times 250 \times \frac{x}{72} \text{ equals } 718$$

72

48

$$M_2 \text{ equals } 24 \times 250 \times \frac{x}{24} \text{ equals } 4000$$

72

24

$$M_3 \text{ equals } 48 \times 250 \times \frac{x}{72} \text{ equals } 4000$$

72

3

$$M_4 \text{ equals } 69 \times 250 \times \frac{x}{72} \text{ equals } 718$$

72

Plot these bending moments to a suitable scale properly located on the load diagram. At the various points, add them and plot a complete curve, which will give the total bending moment diagram. Then scale this maximum moment and it will be found that it is 6750 inch lbs. for this case. Use equation

SI

$$M \text{ equals } \frac{I}{x}$$

and use 13750 lbs. per sq. in. as the unit stress for the first determination of the section modulus. Calculate the section modulus from above equation.

I

$$6750 \text{ equals } 13750 \times \frac{I}{x}$$

$$\frac{I}{x} \text{ equals } .492$$

$$\frac{I}{x} \text{ equals } .492$$

A reference to any structural handbook will show that a $3 \times 3 \times \frac{1}{4}$ " angle has a section modulus of .58,

whereas a section modulus of only .492 is required.

$$6750 \text{ equals } S \times .58$$

$$S \text{ equals } 11650$$

Assuming the base is supported at ends only, the deflection under the given loading is less than $1/16"$ which, under the conditions assumed, is negligible. Therefore, since the stress will be below the assumed limitation and the deflection is negligible, this size angle will be satisfactory.

Using angles, the bedplate is constructed as indicated in Fig. 7. Due to the location of the points of machine attachments as shown on drawing, the side members need only be 69" in length. A $3 \times 3 \times \frac{1}{4}$ " angle weighs 4.9 lbs. per foot. There is the total of 15 feet, made up as follows:

$$\text{Ends..... } 2 \times 21" \text{ equals } 42"$$

$$\text{Sides..... } 2 \times 69" \text{ equals } 138"$$

$\frac{180"}{or 15 ft.}$
The weight is 4.9×15 equals 73.5 lbs.

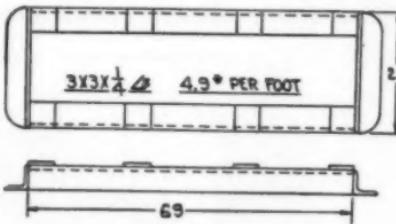


FIG. 7

Fig. 7—Plan and elevation of bedplate.

Calculation from a shear standpoint will show that one inch of $\frac{1}{8}$ " fillet weld on each leg of the abutting angles is all that is necessary to make the joints strong enough to withstand the load conditions. However, a $\frac{1}{4}$ " fillet weld is somewhat easier to make than a $\frac{1}{8}$ " weld. In these joints it would perhaps be more practical to use $\frac{1}{4}$ " fillet weld instead of $\frac{1}{8}$ " fillet. This gives an extra factor of safety at little cost. Due to twisting action on the angles, the welds at each corner should be distributed partly at the toes and partly at the heels. Since the amount of welding in this case is

so small, it would be best probably to put about $\frac{1}{2}$ " to $\frac{3}{4}$ " length at each point. The bedplate is assembled upside down, the joints being welded on the inside. The cutting of the corners as indicated is optional and is largely a matter of appearance.

This is the second in a series of three articles. Part I appeared in the November issue. Part III will appear in a forthcoming issue.

Jessop Steel Bulletins

The following literature, published by Jessop Steel Co., Washington, Pa., is available for any readers who may request it:

4 - page folder describing Jessop Windsor Special Air Hardening Die Steel.

6-page bulletin on Jessop Truform Oil Hardening Tool Steel.

12-page folder describing Jessop 3C and CNS High Carbon - High Chromium Die steels.

12 - pages on Jessop Carbon Tool Steels.

24-page booklet on Jessop Silver-Pin Stainless-Clad Steel.

Chart showing recommended Tool Steels for over 150 applications.

All the Advantages of the Small Press with Every Safety Feature of the Large

AUTOMATIC Knockout Bar
saves time . . . prevents injury.

No more dangerous poking with sticks . . . the bar quickly removes the completed stamping from the die. Saves time, prevents accidents with resultant losses of workmen's hands and fingers. This feature is standard on all Rousselle Punch Presses.

Rousselle Punch Presses will handle small jobs quickly and efficiently, leaving the large presses free for those big jobs. Every safety feature of the large press has been incorporated in this Rousselle model. Don't waste time and money operating large presses.



SAFE . . . Non-Repeating Clutch.

This clutch stops the press at each stroke regardless of the position of foot pedal. Simply constructed, strong, compact and easily accessible. Removal of pin converts press to automatic feed. 10,000 operations per hour possible.

Rousselle has the punch and stamina of a large press. Rousselle can "take it". You will be able to do away with high first cost, high production cost, high power cost, wasted floor space and inefficiency.

May we show you how to save on operating cost?

**DAVID J.
BENTON HARBOR,**

**ROSS CO.
MICHIGAN**

NOW IS THE TIME TO GET YOUR KALAMAZOO METAL CUTTING BANDSAW



Capacity 8"x12"
Floor Space 25"x72"
Weight 550 lbs.

IMMEDIATE
DELIVERY
IS
AVAILABLE!

Plus Value
at Lower Cost

- ★ Hydraulic frame control.
- ★ Enclosed dirt-proof gearing sealed for life.
- ★ Standardized parts throughout.
- ★ Automatic cut-off.
- ★ Quick acting vise.

Kalamazoo T. & S. Co., 508 Harrison St.
ESTABLISHED 1878 Kalamazoo, Michigan

Shop Notes

Small Die-Punch Breakage

By Theodore Oshinsky

A COMMON source of annoyance to die-makers and manufacturers in the metal stamping industry is small punch breakage.

While various methods have been employed to overcome this nuisance, the breakage still persists. But, if we should stop, for a moment, and consider the various contributing factors causing this breakage, we arrive at the following:

(1) Many plants, regardless of size, usually have dies made in jobbing shops. The die, after completion, is carefully inspected by the buyer, but after performing, small punch breakage occurs.

(2) Immediately, the foreman undertakes to check on the die. He endeavors to discover a misalignment—in punch and die-plates. Then, convincing himself a "true" condition exists, he is perplexed and in a quandary. However, a new punch is installed and the operation continues, the foreman trusting to "luck."

(3) Supposing the die had been constructed on the premises, would that have altered conditions? No!



(4) Of course, mechanical skill can differ. But surely as plus is plus, perfectly aligned punches should not continue to break.

(5) Sometimes the steel is blamed; then again, the cause is attributed to inferior hardening and tempering; or, to the stock material to be punched.

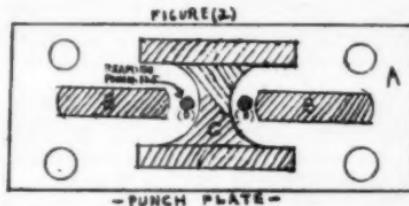
These are all contributing factors in small punch breakage, but, are these

facts not common machine-shop theory?

As an example, let us take the common cross-bar, used by lighting-fixture manufacturers to anchor bases to the ceiling. This is a die-stamping product and has been the frequent cause of punch breakage.

To comprehend this particular item, let us glance at Figure A. To all appearance it is a simple product for die-stamping. Any die-maker could construct a die of this type. Would anyone believe this simple product capable of a high rate of punch destruction? To clear up this problem, it is necessary that we study the causes:

(1) Cross-bars are a low-priced commodity. Keen competition in this field



prohibits the use of standard gauge metal stock; the purchase price being a great factor and deterrent.

(2) Therefore, metal stock is purchased in any sheet width, and then slit on power shears to the proper width required, usually one inch. However, after the slitting operation, the cut strips are anything but flat. In fact, the strips have a peculiar curvature representing a spiral after leaving the cutters.

(3) Of course, this condition does not prevent the metal from passing through the stripper as the plate can be slotted deeply enough to accommodate the curving material.

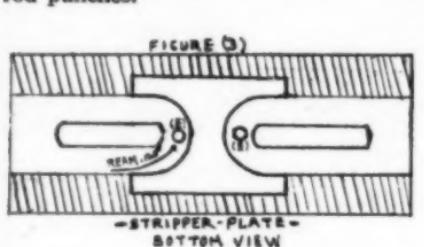
(4) The danger, however, is as follows:—When the punches descend upon

the metal, a certain amount of strain is placed upon the small punches and these punches act as a straightener before piercing.

These circumstances, however, are but partly responsible in contributing to punch breakage. A similar condition can obtain on perfectly flat material, without exception.

In Figure 2 is shown a punch-carrying plate. The plate is constructed in the standard manner. "A" represents the punch-carrying plate; "B" the slotting punches; "C" the cutting off and trimming punch, and "D" .125" punches.

All punches (B) and (C) are arbor-pressed into plate (A). The two small punches (D) are then reamed out .005" larger to accommodate the .125" drill-rod punches.



Of course, you may object that this is not sound mechanical construction. The punches will have a tendency to "float"—how can the punches be expected to enter the die-plate? Also, you may well ask if this practise of loose-fitting the punches indirectly causes punch breakage.

Off hand this appears true. But, let us proceed. Next, we come to Figure 3. This is called the stripper, similar to the punch-carrying plate, with the exception of the slot. Allowing the regular clearance for the punches (B) and (C) we next come to punch holes (E). These holes are carefully reamed to clear punches (D). The result: a piston-like fit to guide the loose punches into the die-plate.

Where space permits, hardened, lapped bushings, are advocated. Needless to say, the hazard of punch breakage is then greatly reduced.

While the aforementioned method is not new, it has been a secret with the

French for years. Relatively little is known of its practice in this country. A carefully study of the facts should prove the hypothesis:

(1) When the punches descend to stamp, the surface of the metal, whether flat or curved, naturally meets the punches. Supposing, for the sake of argument, the small punches, through use, have rounded on one side of their cutting edges, what happens? Remember, these are not stub-punches, but inserted shafts of drill-rod.

(2) The rounded edges on small punches are a source of trouble. When punches in such condition contact hard, spring-like metal, pressure is exerted at the rounded point and a frequent result is a "skid" and a broken punch.

This breakage occurs because a small tightly-fitting punch, entering a stripper plate whose holes have been enlarged by .010" or more, is subjected to a strain plus the amount of clearance embodied in the stripper plate.

(3) Breakage can be avoided, to some extent by the constant grinding of the punches. But, here we meet an objection—the life of the punches is shortened, and the task of dismantling is tedious, not to mention the time wasted.

(4) Why is the French method superior? When the loosely-fitted punches enter the snug fitting stripper plate holes, the carefully fitted, piston-like holes assure alignment of the punches on the downward stroke.

(5) If slow-motion pictures were made of the descent of the punches, one would see the shock instantly absorbed by the stripper guidance holes. Rounded punch edges are ignored because, figuring the distance of penetration, from stripper to die-plate, it is easy to understand why punch "skid" or buckle is less likely to occur when controlled by a fine, piston-like, fitted clearance hole in the stripper plate, which, in turn, assures alignment of the punches.

(Editor's Note:—A punch construction is now available in which the punches are supported and accurately guided by intermeshing sleeves).

LIMA Streamlined GEARSHIFT DRIVES

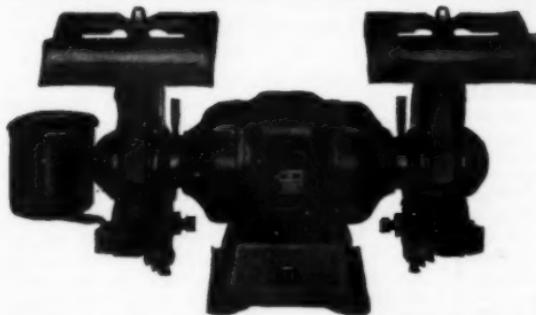
AS \$ 67.50 LESS
LOW AS

Compactness is a superior feature of LIMA Gearshift Motor Units. Counter shafting and the necessity of shifting belts on cone pulleys is eliminated. Shifting is done with one lever, which can be extended to any position that is convenient to the operator.

The belt driven units are designed to drive machines requiring from 1 to 25 H. P., adaptable for either flat or V type belts. The direct motor driven units are constructed in sizes 1 to 25 H. P. Mounting brackets available for all types of machines.

Descriptive material and prices furnished upon request.

THE LIMA ELECTRIC MOTOR CO., 440 N. Main St. LIMA, OHIO



a Real Buy
at \$45.00

New BALDOR Grinder No. 724 has separate, combination lights and eye-shields; tool rests are tiltable and adjustable to and from wheel and up and down; water pot, $\frac{1}{2}$ HP motor, 3400 rpm; 60 cyl. 7"x1 $\frac{1}{2}$ " ALOXITE wheels, Price, \$45.00 without bulbs.

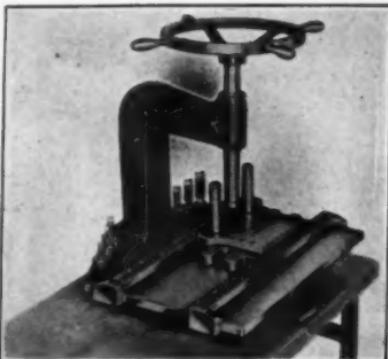
2 YEAR GUARANTEE against BURN-OUT

The COMPLETE LINE of BALDOR Grinders (bench and pedestal types) described in BULLETIN 77. Ask for it.

BALDOR ELEC. CO.
4368 Duncan Ave.,
ST. LOUIS, MO.

BALDOR
BALL BEARING GRINDERS

*Save TIME
TAPS TROUBLE*
with the New
VIKING TAPPER



You save time because the Viking Tapper eliminates the wasting of valuable time by highly paid skilled men trying to tap holes accurately by hand. One fifth the time is required.

You save taps because tap breakage is practically done away with. This enables the use of high speed ground thread taps at lower cost than carbon taps. The savings on taps alone will pay for the tapper in a short time.

You save trouble because Viking Tappers take the trouble out of tapping.

For Precision Tool Room Tapping use the Viking Tapper. Capacity $\frac{1}{4}$ " to $\frac{3}{8}$ ".

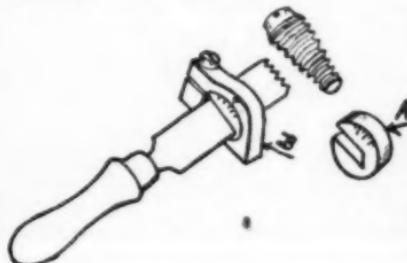
SEND FOR CIRCULAR

**THE VIKING TOOL &
MACHINE CORP.**
14 MAIN ST., BELLEVILLE, N. J.

Screw Threading Tool

By R. B. Ware

I recently made a tool for my own use in making some small taper plugs, threaded to screw into hose pipe (rubber) to expand it. Referring to the sketch, the slotted disk "A" receives the chaser and is clamped in the block "B" as shown. By adjusting the chaser to agree with the angle of the thread to be cut, either single or multiple threads can be cut, and by twisting the chaser in the block to the right or left, either right or left threads can be cut while the threaded parts are held in a lathe and the chaser-block is moved along on any suitable rest.



Unusual Welding Jobs

By Arthur Havens

A rather unusual job was handed to the welder at a small terminal pumping station. Water was pumped from a near by lake. Occasionally the pump failed and created some anxiety as to the supply of water. To eliminate this trouble, it was decided to connect to the city water supply so it could be turned on whenever needed. All progressed nicely until it was discovered that the line where the city water was to tie-in to the pumping station line, was six feet underground and into a 6" cast iron elbow with calked joints—rather a difficult place to join a 4" threaded steel line. After careful consideration, realizing all the hazards possible on a welding job of this sort, the welder decided to drill out the hole in the cast iron elbow and braze in the steel pipe. A hole 4½" in diameter was made in the elbow by drilling a series of ½" holes around the circle and knocking the piece out

with a hammer. The resulting hole was cleaned thoroughly and brightened around the edges. The steel pipe was inserted into the cast iron elbow and using as small a tip as possible, the assembly was brazed, using a bronze rod noted for its strength. This repair has been in service for years and to date has never given any trouble.

Often a piper or welder is caught on a job where suitable dies for threading pipe are not available. Here is another place where welding is handy. A pipe nipple of the correct size generally can be found and it is a small matter to cut this threaded section from the nipple and weld it to the pipe needing new thread. Thus you get a factory-cut thread that will assure a good tight joint.

Recently it was necessary to make a new discharge pipe for a locomotive due to leave the shop in a couple of days. This pipe is made from $2\frac{1}{2}$ " copper tubing. When the piper went for the needed pipe, he found there was none except a short piece about two feet long and not nearly enough to do the job. He explained his predicament to the welding foreman who immediately suggested that he substitute the short new piece for the worst part of the old discharge pipe. He did this and the locomotive went out of the shop as scheduled.

Scribing Gadget

By George Blum

For working sheet metal a combination gauge and scribe may easily be made as illustrated. A piece of scrap metal is cut at right angles to side "B" and at any distance from side "A". Another cut is made at any required angle along the side "A", the two cuts converging at "C" and forming a vee opening. A rule is then laid parallel to side "B" and the desired width to the scribing point "E" is measured across the opening. The excess metal "G" is then removed by cutting from the point along the line "F" at any necessary angle. Only one measurement need be reasonably accurate—the distance from the line "C" to the point "E" parallel to side "B." I have



AUTOMATIC SPOT WELDING SPEEDS UP AND IMPROVES YOUR PRODUCTION

ACE Spot Welders are production tools in use by thousands of leading manufacturers—such companies as R. C. A. Mig. Co., Noblitt-Sparks, G. E., Curtiss-Wright, Stewart-Warner, Delco Radio, Corry-Jamestown, Round Oak, Art Metal Const. Co., General Motors, Timken Silent Automatic, and thousands of others.

Spot welding saves time, requires no preparation, no punching of holes—takes nothing away so strength is not impaired. ACE Spot Welders incorporate the latest developments of the art—improved trouble-free contactors—specially designed welder transformers that provide for better, stronger welds.

There is a type of manually-operated or automatic ACE Welder for practically every requirement . . . Write for Bulletin 40H.

**PIER
Equipment Mfg. Co.**

900-20 Cross St.,
Benton Harbor, Michigan

PEER
ACE SPOT WELDERS

Write for
Catalog 40-H
Free on request



HANDY FURNACE

Every Shop Needs

for
- DIES -
- TOOLS -
PRE-HEATING
ALUMINUM
FORGINGS
•
275° to 1250° F.



DESPATCH Utility FURNACE

A furnace that matches its name. In the tool room or in production this furnace does the job accurately and fast. No lost time waiting for temperature changes or checking temperatures. The Despatch furnace will maintain any point from 275° to 1250° F. — no overshoot or creeping.

ECONOMY • CONVENIENCE • FLEXIBILITY
UNIFORMITY

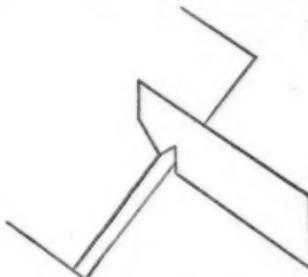
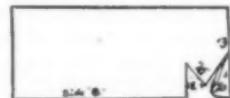
Bulletin No. 83 will give interesting details of how Despatch furnaces can combine many features to make an all around utility furnace satisfactory.

WRITE FOR
BULLETIN 83

DESPATCH
OVER COMPANY
MINNEAPOLIS MINNESOTA



often made these gadgets in preference to looking about for and setting a standard gauge. Once made, a number of these gauges may be kept in a box at a handy spot on the bench, although a new one can be quickly made as needed.



Saving with Ball Bearings

By W. F. Schaphorst

Not long ago an instance was brought to my attention where, by the installation of ball bearings hangers on line shafting, 25% less power is now required than formerly. The entire plant has been equipped with ball bearings. A report concerning this plant contains the following interesting information in one paragraph:

"One section supplied by a d.c. generator required between 1600 and 1800 amperes at 130 volts when babbitt bearings were used. The same load is handled with a current of 1200 to 1300 amperes which shows that the minimum reduction is about 25% of the original load. The power saved per day is 468 Kilowatt hours, which in a year's time at 2 cts. per Kilowatt hour is worth \$2,808. As this section of the plant takes about one-third of the total amount of power used, the saving from the use of ball bearings in the entire plant would be approximately \$8,424. per year."

Also, according to the manufacturers, this report shows that the saving will pay for the complete installation of ball bearings in less than two years.

From time to time we read and hear much criticism concerning the life of ball bearings. Some believe that ball bearings are short-lived. The manufacturers in this instance, claim that their bearings have been used steadily for 10 years. They say that ball bearings "Cost more than babbitt bearings of course, but they repay the difference in cost, in power saving alone, in less than two years' time, and after that are earning a clear profit."

Safety Factors

By W. F. Schaphorst

It is recommended that for most belt drives, a safety factor of 1.3 be used. In the end, it usually pays to make drives amply large, especially where loads fluctuate as violently as they do, on shapers, planers, saws, etc.

Every experienced worker knows that belt drives on some machines wear out rapidly, while on other machines, the belts seem to last indefinitely.

Of course, there always are "reasons". If the source of power is a motor with high starting torque, the motor may be to blame. Or, the machine load may be such that there is a sudden peak, considerably higher than normal, in which event the driven machine is to blame.

Where the load is non-fluctuating, and where there is no high starting torque, belt trouble is seldom experienced. In these cases a safety factor is not needed. Such drives are "normal".

Also in the event the entire power output from a steam engine or internal combustion engine is transmitted through a belt drive, the capacity of the drive should be made equal to the maximum power delivery of the engine. In other words, do not use a safety factor.

Where the belt drives any given machine, determine as nearly as possible, the maximum power consumption of

The NEW VERNON
NO. 0 PLAIN MILLER
with
**LONGITUDINAL
POWER FEED**



**HI-SPEED
PRECISION MILLING**

Here's the latest design. Compact, streamlined Miller for precision work on smaller parts. Equipped with screw feed. As an extra, it embodies a longitudinal power feed which includes two 3-step cone pulleys, bracket for adjusting belt tension, telescoping drive shaft with universal joints and fully enclosed worm and gear. Fully enclosed variable speed drive, with correct spindle speeds for every job. Choice of two standard speed ranges: 100-1000 r.p.m. or 150-1,500 r.p.m. Heat-treated steel ground spindle mounted on Timken tapered roller bearings. Pyramidal base. Overall height 60". Weight 750 lbs. The vise and adapter for holding end-mill cutters can be furnished as extras.

WRITE FOR BULLETIN TODAY

The Vernon Line of



HORIZONTAL MILLING MACHINES,
COMBINATION VERTICAL MILLING
MACHINES & JIG BORERS, & 11" SHAPERS

MACHINERY MANUFACTURING CO.

3630 IRVING STREET, VERNON, LOS ANGELES, CALIFORNIA

EXCELSIOR No. 14 ANGLE ROLLING MACHINE

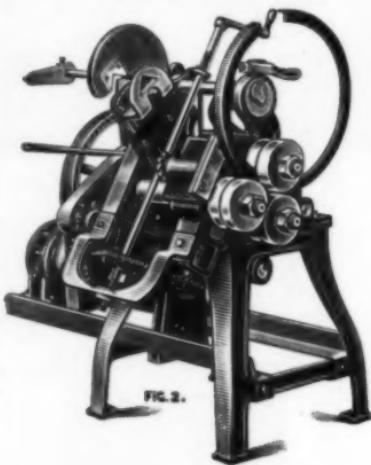


FIG. 2.

Capacity 2x2x $\frac{1}{4}$ " Angles. All the rolls are direct driven avoiding slipping of the material between rolls, which are operated by the oversize Excelsior friction clutch. Write for Price and Testimonials.

We specialize in Automatic Grinding and Polishing Machines, to polish Stainless Steel Sheets, Automobile Bumpers, and parts, Stove and Range Top Castings, Electric Iron Sole Plates, etc.

Also Inside Cutting Shears, Deep Throat Power Punches for duplicate work by the use of horse shoe templets up to No. 12 gauge. Used in Stove, Range, Air Conditioning and Kitchen Equipment Plants.

**EXCELSIOR
TOOL & MACHINE CO.**
East St. Louis, Illinois

that machine at peak load. If the load fluctuates, and if only the normal consumption is considered, the drive will almost invariably be too small and the belt will slip and burn, and in time it will break.

For example, if the normal load of a machine now in use is 10 h.p. and the peak load is 14 h.p., the safety factor for similar machines is determined by dividing the peak load by the normal load. In this case the factor is 14 divided by 10 equals 1.4. All machines, then, with similar drive characteristics, should be equipped with belts having a 1.4 safety factor. In other words, multiply the normal load of the machine by the predetermined "safety factor".

This rule applies to all kinds of flat belts—leather, rubber, canvas, etc., and also to V-belts.

Hand Extinguishers Cut Fire Losses

Hand fire appliances provide the greatest saving of property and life of all fire protection equipment, H. W. Lange, assistant engineer of the Underwriters' Laboratories, Inc., told the National Safety Congress in Chicago recently.

"Fifteen per cent of fires upon which alarms have been given, are extinguished before arrival of Fire Department equipment," he said. "Sixty per cent of the fires which the Fire Department is called upon to control are extinguished with hand fire appliances. Fifty to ninety per cent of all the fires occurring in industry are extinguished with hand fire appliances without the necessity of calling in the Fire Department."

He cited the experience of one large industry with fire extinguisher protection, where over 3,000 fires occurred during the course of a year, and all but two or three of them were extinguished with hand fire extinguishers. The fires which did not require hose streams involved little or no interruption of business or the losses attributed thereto.

DURO America's Finest-

*Today YOU GET
More FOR
YOUR MONEY
in
DURO 10" Tilting Arbor Saws*



A production saw for your crating, maintenance or any department requiring accuracy and outstanding performance.

Duro Engineers have designed this saw for use with any standard motor—special or closed frame motors are not required, thereby saving the user added investment or costly savings when a special motor breaks down. A chute encloses the blade and forces sawdust down to the bottom of the base eliminating dirt accumulation on the working parts. Rip fence locks at front and rear to insure accuracy. Heavy DeLuxe mitre gauge locks without creeping, assuring more accurate mitre cuts. A compartment built into the base provides storage space for extra saw blades and dado heads, making the machine an entirely self-contained unit. New 1941 catalog tells all about this and other tools.

Made by DURO
Manufacturers of America's Finest and
most complete line of Power
Driven Machinery.

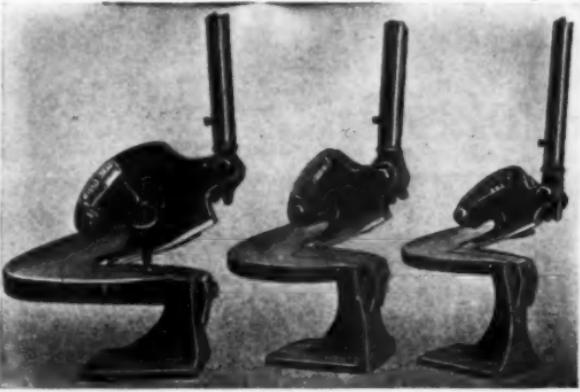
*It will
pay you to
get the facts*
**WRITE FOR
DETAILS**

DURO METAL PRODUCTS CO.
DEPT. BB-12 2649 N. KILDARE, CHICAGO, ILL.

Straight and Irregular SHEET METAL CUTTING SHEARS

Three Models of Beverly Shears are offered to fit the job. Model B-1 weighs 16½ lbs.—cuts stock up to 14 gauge. B-2 weighs 32 lbs.—handles up to 10 gauge. B-3 weighs 55 lbs.—takes up to 3/16" mild or 10 gauge stainless steel.

*Reasonably priced.
Send for descriptive
circular*

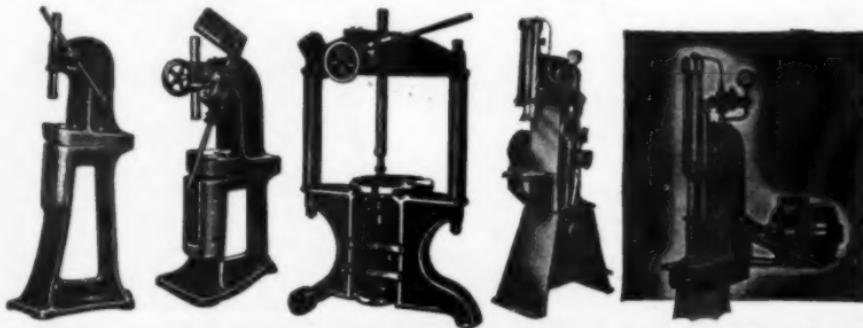


THE BEVERLY SHEAR CO.
3007 W. 110th ST.,

CHICAGO, ILL.

BROACH and ASSEMBLE

65 standard styles and sizes—manually operated presses from $\frac{1}{4}$ to 35 tons pressure—motor driven hydraulic presses from $1\frac{1}{2}$ to 15 tons pressure. Write for catalog F.



GREENERD ARBOR PRESSES

NASHUA

EST. 1883

NEW HAMPSHIRE

New Trends and Developments

THE successful construction of an emergency mechanical respirator, by 30 metal shop workers to save the life of a co-worker's 10-year old son, stricken with infantile paralysis, was reported recently from Grand Rapids, Michigan.

The youth, Cabell Pratt, son of Percy P. Pratt, western division engineer of Post Products Co., sheet metal fabricators, was stricken on Sunday. Following a frantic but fruitless state-wide search for a respirator, the father reported his dilemma to the chief engineer and, at 9:30 Tuesday morning, the actual job of constructing the "lung" began. The 30 workmen toiled continuously for 28 hours, working all night Tuesday. Structural details were taken from one of two standard Drinkwater-Collins iron lungs in use at a local hospital, and an engineer produced the plans for the emergency unit.

The men cut the parts of the breathing machine from 14-gauge sheet metal and arc welded the pieces together by the popular shielded arc process. Then they installed wires, valves, gauges and electric motors. Framework is of angle iron arc welded. Portability is provided by 6 casters.

The "Tailor-made" breathing machine, completed at 1:30 P. M. Wednesday, three full days before the disease reached its crucial stage, was accurate to the last detail.

Construction of the lung, which ordinarily would require many weeks and cost \$1350, was made possible, in such short time and at a low cost, by



the electric arc process of joining metals. In this, the fabricator simply cuts metal to the sizes needed and fuses the pieces directly together. No time or labor is required in locating rivet holes, punching them, lining them up, inserting gaskets and heading up the rivets.

Experience with the arc welding process on the part of the metal shop, coupled with the skill and ingenuity of the workmen in applying it to a particular fabricating problem, made it possible to meet an emergency which could not have been met in any other way. Without this modern process, a life might have been forfeited.

(Photo Courtesy Lincoln Electric Co.)

2—Semi-automatic Sandblast

An ingenious new arrangement may be used for cleaning or finishing, as well as for stencilling letters and designs on a wide variety of parts of small or medium size.

The machine is entirely self-contained, all work being done undercover.

ONE WORK SET-UP AND THIS MACHINE WILL DO THE REST



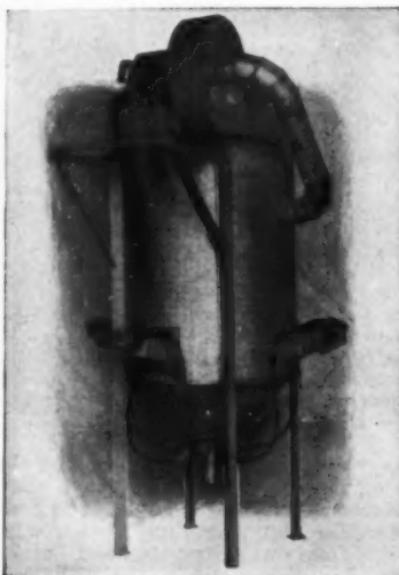
"ALL ANGLE"
MILLING MACHINES AND
MILLING ATTACHMENTS.

MANUFACTURED BY

F R A Y
MACHINE TOOL CO.
GLENDALE, CALIFORNIA.
U. S. A.

There are three revolving tables around the machine, each table having holding fixtures to the number of six or a dozen, each holding one article.

These revolving tables, motor operated, are loaded in each one of the holding fixtures and begin to revolve, bringing one article into the side of the cylindrical sandblast cabinet and directly under two enclosed sand-blasting nozzles.



After remaining under the nozzles for a prearranged time, the table rotates, bringing the next article under the nozzles and repeating continuously. The same procedure takes place simultaneously with the other two revolving tables.

One attendant, sitting in front of each revolving table, removes a finished article when the table comes to a standstill for the sand blasting of the article on the opposite side of the table, replacing it with a new piece to be sandblasted.

The sandblast itself, with its three enclosed stations of two nozzles each, is cylindrical in shape with a strong-

suction motor-driven dust collecting fan and dust separator.

This dust collector maintains an in-drawing draft at each nozzle station preventing the outward escape of dust and sand.

The nozzles are all continuously fed with the abrasive being used, whether it be ordinary sharp white sea sand, or the various grades of flint, emery, carbonadum or crushed or granulated steel. The abrasive is used over and over again until entirely consumed or reduced to the fineness of dust and deposited in the cleanout section.

3—Open Hearth Plate

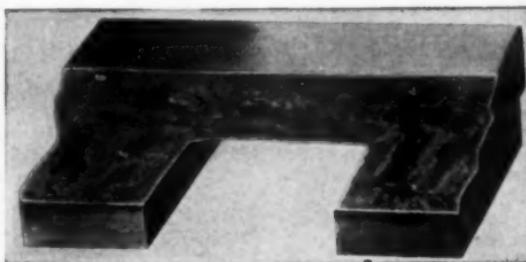
A recently developed low carbon open hearth steel plate is said to machine without tearing and is usually machined without resorting to the use of cutting oils.

Because of its free machining qualities, tool life is greatly extended, regrinding being kept to a minimum it is claimed. It can be machined at 150-250 s.f.p.m.

It is described as ductile, resistant to impact and abrasion because of the manganese throughout the matrix. It has high shear and compression values and excellent physical properties with a tensile strength of 62,000 to 72,000 per sq. inch. Hot rolled plate 4" thick shows a Brinell hardness of from 141 to 156.

Its characteristics make it ideal for forging, cold forming, pressing as well as machining. It can also be welded readily. Analysis is given as:

Carbon .20, Manganese 1.25, Sulphur .250, Phosphorous .03 Max., Silicon .02 max.



THIS
Profitable Feature
AT NO EXTRA COST!



UNBRAKO

Reg. U. S. Pat. Off.

Knurled
SOCKET
CAP SCREWS

STANDARD PRESSED STEEL CO.

JERKINTOWN, PENNA.

INC. 1911

BRANCHES

BOSTON • DETROIT • INDIANAPOLIS • CHICAGO • ST. LOUIS • SAN FRANCISCO

The cold-forged "Unbrako" head is unique by being knurled to insure a non-slip grip. It appeals equally to mechanics and designers because it saves set-up time and space; making locking practicable and improves looks.

And, last-minute alloys, skilled heat treating and precision machining endow all "Unbrako" Products with outstanding strength and accuracy.

Be sure to specify "Unbrako".

It can be rapidly carburized. Penetration is deep with a uniform case of from C62 to C66 Rockwell, combined with a tough core that averages from C15 to C27 Rockwell.

It is recommended for bearing, bolster, wear and stripper, die casting, metal forming roller and other dies, machinery and candy cooling tables, bed plates and composing tables, gears, sprocket wheels and molds for plastics, rubber and fibre, jigs and fixtures, etc.

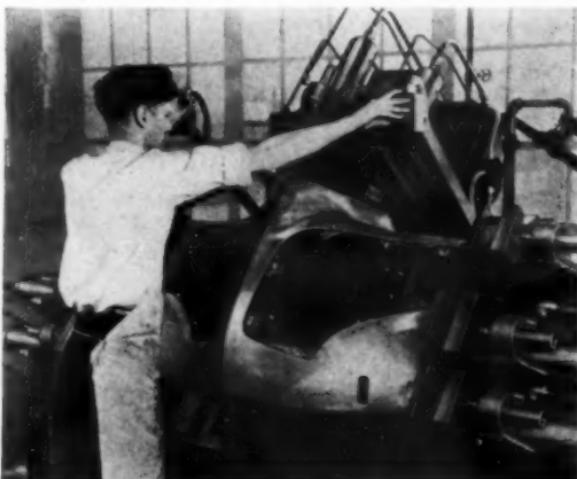
4—Hydraulic Punching Fixtures

Elimination of large and costly dies and large press equipment with cam mechanisms for punching mounting holes in various sheet metal parts for a 1941 model automobile has been accomplished through development of special fixtures made up of small individual punching units and die sections.

The fixtures used consist of individual hydraulic punching units, each having one or more punches and mounted on die brackets which are in turn mounted on the base plate of the fixture. Instead of a large single piece unit, the punching die is made in sections. These are also mounted on brackets so that each die and unit form a complete punching setup in itself. When changes are re-

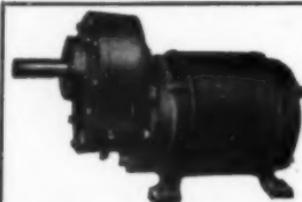
quired, it is necessary to move only those units affected—changing punches and the particular die section as needed—the remainder of the fixture remaining intact.

The individual hydraulic punching units are of the heavy duty guide pin type to permit the accurate punching of one or more holes per unit. Air return (the hydraulic pressure operating against the constant pressure from factory line) and spring stripping are employed to provide the required speed of operation, which is approximately



100 pieces per hour.

A self-contained motor-driven hydraulic pump supplies sufficient pressure for simultaneous punching of all holes.



Janette Speed Reducers

FOR SLOW SPEED DRIVES

43 Sizes—1/50 to 10 H. P.—.08 to 1140 r. p. m.

This style of reducer is especially well adapted for driving thread millers, gear hobs, punch presses, shears, keyseaters, planers, etc. It is easy to mount—requires small space—gear head can be rotated 360°.

Ask For Your Copy of Our 100-Page Bulletin

Janette Manufacturing Company

556-558 West Monroe Street Chicago, Ill. U.S.A.

18 other styles of Janette reducers are available.

★ FOR TOP VALUE!

MARSHALLTOWN PRESSES

BETTER PRODUCTION



LONGER LIFE



THE MOST FOR YOUR
MONEY!

Marshalltown Presses are engineered and built to give the utmost in dependable, trouble-free service. Features of design include more die space, chrome nickel cranks, wrist pin connections and many other proven advantages. Available in capacity of 5 to 70 tons—each one an outstanding value.

Write today for literature about Marshalltown Presses—available in capacities from 5 to 70 tons.

*Write today for literature
about Marshalltown
Presses.—available in
capacities from 5 to 70
tons.*

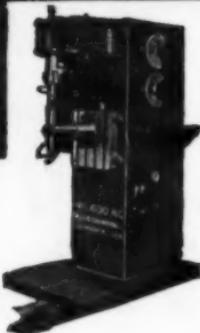


NO. 5 FLYWHEEL TYPE

MARSHALLTOWN MFG. CO.
900 E. NEVADA ST., MARSHALLTOWN, IOWA

SOLVED!

Your
WELDING
PROBLEM



Season's
Greetings
and
Best
Wishes
from

Chas. Eisler

PRESIDENT

CHAS. EISLER
EISLER ENGINEERING CO.
762 So. 12 St. near Avon Ave., Newark, N.J.

5—Applicator

An ingenious new device automatically and mechanically applies compound to the faces of buffing wheels—in an exact controlled amounts and frequencies. It can be used in connection with lathes for hand buffering. It is especially useful on all types of automatic and semi-automatic buffing machines.

Aside from a material saving in the operator's time, a real saving in buffering compound is claimed and there is no overloading of the wheel face.

The applicator is a self-contained unit which may be moved from one machine to another, with simple attachment to an electrical current source. Can be mounted in any required position from horizontal to vertical.



Adjustments are provided to control the amount of composition applied at each stroke; and the number of strokes per minute. As the wheel wears, a simple adjustment keeps the applicator in proper adjustment.

Two models are available for 4-5" and 8-8½" wheel faces.

6—Abrasive Cut-off

A new dry abrasive cut - off machine is arranged for bench mounting. It is of advanced design and suitable for cutting hard metals, plastics and ceramics, etc.

Abrasive wheel and motor are balanced on a heavy cast iron I spindle frame, eliminating counter weights, lessening the load on the trunnion bearings. Spindle is of alloy steel, ball bearing mounted. Spindle frame has an adjustable 2-way stop to regulate depth of cut and save lost motion. A swivel vise of the V-block type permits cuts from 90 to 45° angles.

A ball bearing 1½ h.p., 3-phase, 3600 r.p.m. motor is used, driving wheel through two V - belts. Wheel is 10" in diameter with $\frac{3}{8}$ " hole. Wheel speed is 9000 feet per minute. Overall size is 29"x35"x24" high, and weight is 220 lbs.



7—New Furnaces

Two new furnace units are timely in connection with the production step-up for the defense program.

Meet the Increasing Demands of Industry by using Colwell Tool Post Turrets



Available for 9° to 20° lathes with a new "Midget" size for smaller lathes. Also furnished for turret lathes. Provides four positions. In operation it is fast, simple, accurate and dependable. Write TODAY for your copy of bulletin.

S. G. COLWELL
25 Congress St., Providence, R. I.

LUMA

Combination
Etchtool —
— 3 —
Tools
in 1



Luma Marking and Demagnetizing SIMULTANEOUSLY

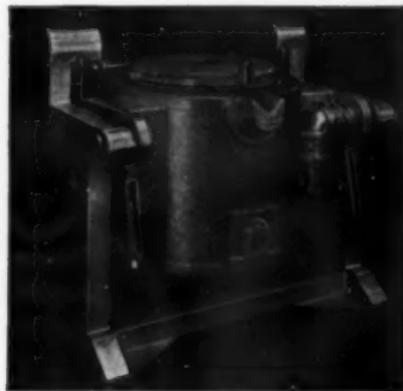
Writes on hardened steel — demagnetizes at the same time—with carbon point does light spot annealing and soldering jobs. Compact—easy to use—dependable.

Send for details—5-day FREE TRIAL OFFER!

Luma Electric Equipment Co.
Dept. H—Main P. O. Box 132, Toledo, Ohio

The Motorized Nose Pour Crucible Furnace is especially adapted to melting aluminum and magnesium metals and features a constant pouring arc. The pouring lip has been brought to the center of pivot by the unique mounting of furnace on trunnions axised in line with the lip. Models of this furnace, specially adapted to aluminum melting, are modified for added insurance against porosity of metal produced.

This furnace is further adapted to pouring ingot and permanent molds transfer ladles, bearing metals, etc. Ingot poring—molds can be conveyed to the point of pouring on either turn



Special Anti-Mushrooming Anti-Chipping Heat-treat

Oversize Shanks ▶

Exclusive
Knurled Back ▶

Exclusive
Thumb Grip ▶

Broach-
Rounded ▶
Corners

and
a
complete
line of
Marking
Devices

Write for Price and
data Bulletin No. 113-12A

**NEW METHOD STEEL
STAMPS, Inc.**

149 Joseph Campau, Detroit



table or movable rack carriers. Permanent molds—may be mounted on turn tables and poured direct from furnace. Transfer ladles — can be spotted below pouring lip of furnace and remain fixed thru-out entire pouring operation. Bearing metals — are poured direct to molds. The special trunnion mounting employed permits low construction and thereby simplifies charging. Built-in standard sizes for 150 crucibles and up. Also can be supplied with iron or steel pots to order. Available in oil and gas fired units.

The Gas Fired, Iron Pot Melting Furnace is built in capacities from 100 to



Plain Type

CLOSED

TRADE



CLOSED

MARK



Offset Type

OPEN

CONTINUOUS HINGES

All hinges shown can be furnished with special holes, cutouts and bends to blue-print in metals to suit the job.

THREE-FOURTHS OFFSET

AUTO MOULDING
& MFG. CO.

2326 S. CANAL ST
CHICAGO

SPECIFICATIONS:
Open Width $\frac{3}{8}$ " to 6"
Gage Material .040 to .125
Pin Diameter .101 to $\frac{1}{4}$ "
Lengths to 120"

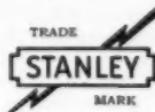




CONTINUOUS PRODUCTION in 12 gauge hot rolled steel is this 144A Unishear's job. It's built to handle continuous production or prefabrication of sheet metal products.



NO STARTING HOLE NECESSARY FOR INSIDE CUTS. This plant's Stationary "O" type Unishear cuts costs and time required for setting up heavy machines and making trimming dies. Cuts curves down to $\frac{1}{4}$ " radius.



"Mighty Midget" Unishear is easier to handle than snips. Smooth, clean cuts—no waste of material. Cuts 18 gauge hot rolled steel...any pattern. The pivoted handle provides a comfortable

Only
STANLEY
Builds The
UNISHEAR



grip for use in any position. Ask for a demonstration, or write to us today for descriptive literature. Stanley Electric Tool Division, The Stanley Works, New Britain, Connecticut.

STANLEY UNISHEARS
THE ELECTRICALLY DRIVEN HAND SHEARS

10,000 pounds in zinc and features:—
 (1) proper proportioning of flue and combustion chamber areas to varying fuels to provide increased production and a higher b.t.u. recovery. (2) Assurance of uniform distribution of heat over entire surface of pot, by eliminating inert gas stagnation and blanketing around upper portion of pot. (3) Tangential firing arrangement of the burners is claimed to minimize the effect of flame impingement on the pot and furnace walls, which together

with even distribution of heat over entire pot surface materially reduces maintenance on both pot and combustion chamber. (4) Rugged construction contributing to long furnace and pot life.

"Zeta-Sol Water Soluble Cutting Compound Reduced our costs 78%"

Reports one of the Big Three Motor Companies who formerly used sulfurized cutting oils. Their tool costs showed a reduction of 21%!

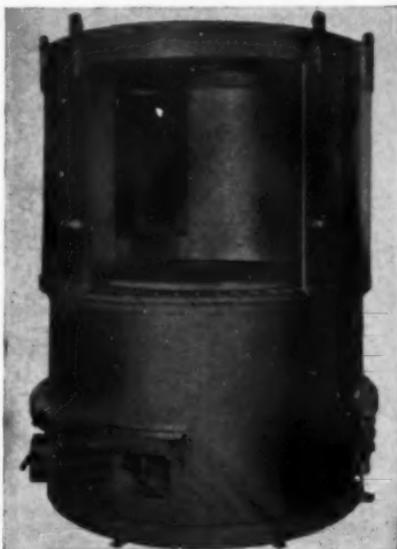
Zeta-Sol is a water soluble compound, with castor oil base, in the form of thick paste. This cutting compound is used on these operations: reaming, hobbing, boring, cutting, milling, broaching, grooving, turning, pipe threading, tapping and spinning. Zeta-Sol cools the work, increases tool life, steps up production, gives better finish to parts, and saves time and money.

Why not try it today. Let us send you a free sample or more details.

WAYNE CHEMICAL PROD. CO.

Mfrs. Meltonatic Paste Solder, Protex Non-Rust Oils and Coatings.

9446 Copeland Ave., Detroit, Mich.



8—Coating Draw Lubricant

A new coating machine has been developed for applying draw compound to steel sheets preparatory to shaping or forming.

It consists of two corrugated rubber coating rolls for coating the sheets on both sides. A "Doctor" or scraper roll is used in conjunction with each coat-

BURR KEYSEATERS



Mill keyways in the run or on the ends of shafting already erected—save money on alteration, erection, and repair work.

Made in 4 sizes, for hand or motor operation.

Write for Bulletins and prices.

JOHN T. BURR & SON
429 Kent Ave., Brooklyn, N. Y.

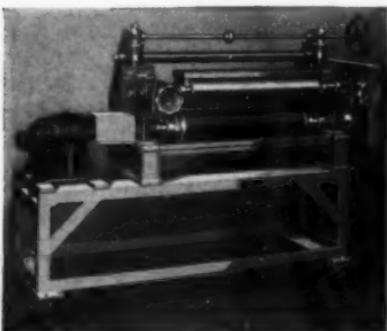
TANNEWITZ Abrasive Cut-off Machine



Uses Abrasive Wheels or Saws, and instantly swivels and cuts any angle from 45° left to 45° right, doing clean, instantaneous work on metal bars, shapes or tubes.

THE TANNEWITZ WORKS
Grand Rapids, Mich.

ing roll, not only to govern thickness of spread but also to form a roll crotch to hold the compound. If so desired, the lower coating roll can be adapted to pick up its supply of mixture from a stationary or adjustable pan. Calibrated adjustments are used for governing the spread, as well as for adjusting the opening between rolls for thickness of metal.



A large manufacturer recently installed one of the machines alongside a 75-ton press which shapes steel sheets into radio cases, heater shells, etc. Metal sheets are fed through the coater, and a very heavy draw compound is applied in a thin, accurately governed spread to both sides—the purpose of the draw compound being to act as small ball bearings when in press to permit movement of metal when deep draw forming is being accomplished.

It is claimed that the machine permits an estimated saving of about $\frac{1}{3}$ in draw compound over the hand brushing method, and produces considerably more work in shorter time. Drive is usually by a direct connected geared-head motor.

If desired, the machine is furnished on a welded steel stand mounted on casters, as illustrated, to permit moving to different positions. It can be had in any width—in regular or extra heavy construction, in bench or floor model, and for single or double coating.

9—Flexible Couplings

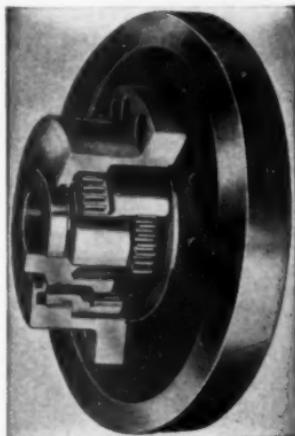
For connecting a shaft directly to a flywheel, brake drum or flange, a new

coupling is said to provide complete flexibility with approximately one-half the axial clearance required by other types of couplings. Moreover, the dummy, pilot or stub shaft generally necessary with other types of couplings is eliminated.

The new coupling is equally applicable for connecting two free-ended shafts in combination with a solid, flanged, half coupling, which gives a remarkably close-coupled connection.

When two units are coupled to a single driver with the couplings, it is possible to operate one unit by unbolting the coupling and drawing back the outer sleeve on the unit which is not to be used. As the hub on the driver is solid, there are no loose parts to interfere with free rotation of the driving shaft.

In connecting shafts of different diameters, coupling, or flexible member, is mounted on the smaller shaft and bolted to a rigid, flanged, half coupling on the larger shaft. Since the size of the flexible member is determined by the size of the smaller shaft, a smaller and lower priced coupling can be used.



Compensation for misalignment is made by an internal sleeve which floats between an externally geared hub and an internally geared covering sleeve. The internal sleeve, which engages the hub and outer sleeve, is free to slide

and rock, compensating for differences in alignment. The driving member of the coupling can be either the geared hub or the covering sleeve.

The coupling is suitable for all usual applications and for many special applications as well, such as connecting a shaft to an engine flywheel; connecting one shaft to another which carries an overhung brake drum; connecting shafts of different diameters; connecting driving shaft to roll or pinion stand when radial clearance is insufficient for a standard coupling; and combined with a magnetic or pneumatic clutch coupling.

10—Welding

Positioner

A new welding Positioner for pieces weighing up to 2500 pounds is available. Designed to facilitate the handling of material in welding shops, the machine is claimed by the manufacturer to reduce welding costs substantially and to speed up production.

The all welded table top, with T-Slots for easy clamping, revolves a full 360° and tilts 135° beyond horizontal. A worm and worm wheel arrangement makes the table self-locking when handling unbalanced loads. The machine is available with hand wheels for manual operation or tilting and revolving motors with remote controls push buttons.

11—100 Watt Fluorescent Lamp

A new 100-watt Mazda fluorescent lamp, claimed to be the largest yet made and possessing over twice the power of any heretofore manufactured for commercial and industrial purposes, has just been announced.

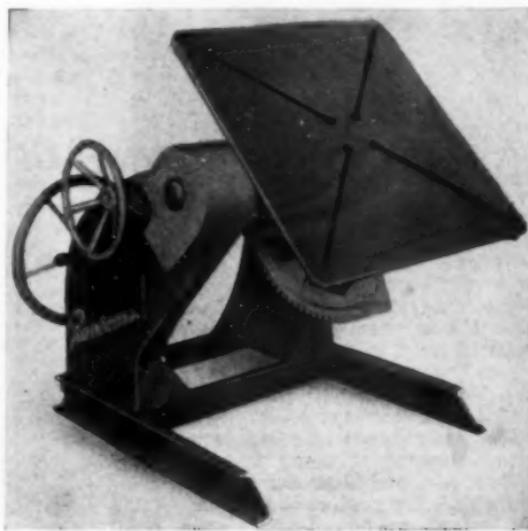
Five feet long and $2\frac{1}{8}$ " in diameter, it will be available in the 3500° white color, which has proved most popular and adaptable to the greatest number of uses. The 100-watt lamp adds a

seventh size to the line of fluorescent lamps now being manufactured.

The lamp is intended for use in stores, offices, industrial plants, and elsewhere. Allowing higher mounting heights, it will reduce the size and number of fixtures necessary to supply a given amount of light. The new lamp has a rated initial output of 4400 lumens and a rated life of 2000 hours.

A New Whitney-Jensen Catalogue

The Whitney Metal Tool Co., 115 Forbes St., Rockford, Ill., has issued Catalogue No. 14. This supersedes all



previous numbers and shows some machines and tools that were not offered previously. The Whitney-Jensen line includes punches, shears, bending brakes, and other metal working tools and machines.

Catalogue No. 14 contains two features of value to practical shop men. One is a table of U. S. Standard Gauges. The other is a table which shows the proper punch to use in punching a certain size hole in a certain thickness of 0.25 Carbon Steel.

L-W LATHE CHUCKS



4 JAW INDEPENDENT L-W LATHE CHUCKS

Semi-Steel body, ribbed construction, hardened and ground steel reversible jaws—Made to stand the gaff. We are proud to offer such Hi-quality at low cost.

10"	Size	\$29.00
12"	Size	33.50
14"	Size	38.00
16"	Size	47.00
18"	Size	62.75

Send today for new free catalogue

Also Mir's. of
Magnetic Chucks
Demagnetizers
Milling Machine Vises
Power Hack Saws
Dividing Heads

L-W CHUCK CO.

1-7 N. ST. CLAIR ST.,

TOLEDO, OHIO

3

**1****HANDEE**

Tool of 1001 uses

The 12-ounce portable "power house" that repairs hard-to-get-at parts on machines without removing the part. Smooths off rough spots on dies and tools, cleans delicate mechanisms—grinds, drills, polishes, cuts, routs, carves, sands, saws, sharpens; engraves, etc. Uses 300 accessories. Plugs in any AC or DC socket. Speed, 25,000 r. p. m. \$18.50 postpaid with 7 Accessories.

The order of today is greater production in less time—with lost motion. Let's all get going!

2**HI-POWER
GRINDER**

Constructed for heavy duty service and does it give smooth performance! Enough steady, vibrationless power to drive a 2½" diam. wheel with precision accuracy. Speed 17,000 r.p.m. Wt. 3 lbs. In wood case with 3 Chicago mounted wheels, drum sander and bands, 2 collets, wrenches, dressing stones, \$35.00.

In foundries, machine shops, tool and die plants—wherever metal is used or shaped—these three portables are necessary because they are of such tremendous assistance: (a) Handee Tool of 1001 uses, (b) Hi-Power Grinder, (c) a good stock of Chicago Mounted Wheels.



BEST WHEELS EVER MADE— and the TOUGHEST!

The most important discovery in mounted wheels in 30 years. So strong that they give 150% to 300% longer life than ordinary wheels—and cost no more. They grind more pieces per wheel, faster and without sacrifice of cutting action. V/T Super Bond wheels hold their shape longer, will not ridge on grinding welds, sharp corners, sinking dies, barbering and other difficult jobs. But don't take our word for it—

TRY ONE—AND BE AMAZED!

Let us send a sample wheel. Tell us the kind of job, type of equipment you use and size wheel you'd like to make your own test.

10-DAYS FREE TRIAL

Send for either De Luxe model HANDEE or the Hi-Power and try it for 10 days in your own plant.

- Send Free Wheel. Size _____ HB-12
- Catalog of Handee Products and Grinding Wheels
- Deluxe Handee on 10-Days Trial
- Hi-Power on 10-Days Trial

Name.....

Address.....

64-page CATALOG
Send for illustrated catalog covering
all Chicago Wheel Products.

CHICAGO WHEEL & MFG. CO.
Makers of Quality Products for 40 Years

1101 W. Monroe St. Dept. HB, Chicago, Ill.
Canadian Distributor: Canadian Trade Corp., Ltd. 1332 Williams St., Montreal

3

MONTED WHEEL
OF V/T SUPER BOND



Installation In a Detroit Plant



Stocks Carried
In Stores of
Manufacturing all
Types of
Machines

Price of 3-Speed
Box with Brakes

\$87.50

4-1/2" Box
5" Box and Pump

MANUFACTURED BY

DRIVE-ALL MANUFACTURING CO.
3401 Conner Ave. Detroit, Michigan

What's New in the Industry

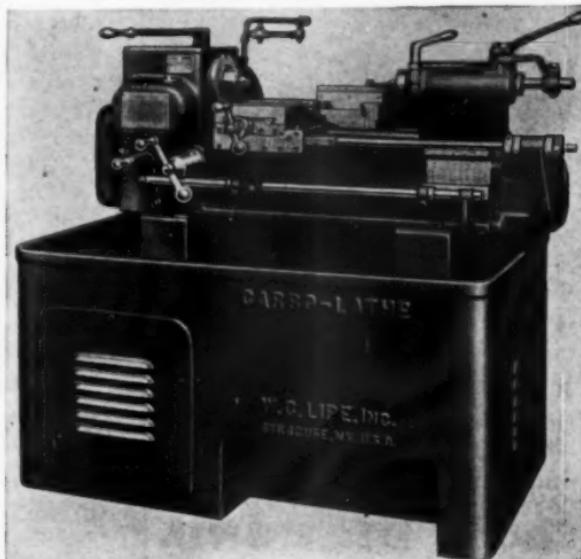
Lipe Presents a New Carbo-Lathe

DESIGNED for high production turning, taking full advantage of modern alloy tools, the new Carbo - Lathe is now offered with improvements that add to rigidity and increase the ability to take heavy, precise cuts in tough materials at high speeds without chatter or tool breakage.

In this latest model, the base is a box section that completely incloses the motor and drive mechanism. All controls are out of sight. The motor cabinet is considerably larger, to accommodate amply, a motor rating as high as 10 horsepower A. C., and to provide additional space for free air circulation and efficient motor ventilation. The base also houses a coolant tank of double capacity, and a large size chip pan. Recessed top room is provided, of sufficient height to prevent interferences even when the operator stands on a platform. A compartment at the end of the base gives room for storage of tools and accessories.

As use of this rigid box-type construction requires no additional floor area, the lathe retains its advantage of compactness for close grouping.

The size permits 12" swing and 18" between centers. Power from the motor is applied through a worm drive. Reduction of friction is obtained by mounting the spindle on two Timken bearings and by using ball bearings on the clutch pulley,



clutch shaft, worm shaft, feed worm-gear shaft, clutch-feed shaft, hand-feed shaft, rack pinions and feed shaft in bed.

Headstock and bed are cast in one solid piece, of chrome-nickel iron weighing 600 lbs. A correspondingly heavy tailstock is used, of two-piece construction. Tailstock quill is 3" in diameter, for rigidity. Its center can be operated by handwheel or lever, supplied optionally.

Rigidity of construction throughout gives the new lathe ability to withstand multiple tooling and high cutting speeds, it is claimed. Design further provides for great flexibility of set-up and quick change from one set-up to another, in order to accommodate small lots efficiently.

Full details may be obtained from W. C. Lipe, Inc., Syracuse, N. Y.

For each make and size of Screw Machine



Sutton DIAMOND-GRIP Collets are expertly designed and accurately machined to suit the specifications of each make and size of screw machine. They all have Sutton diamond serrations that grip tighter under less tension. Only Sutton Collets are diamond-serrated.

Sutton DIAMOND-GRIP Collets

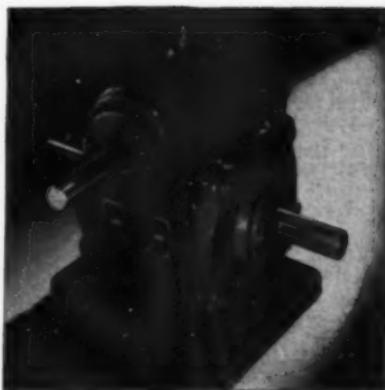
Ask for
complete
Sutton
Catalog



SUTTON TOOL COMPANY
2895 W. GRAND BLVD., DETROIT, MICH.
Accessories for Screw Machines

Smith Speed Reducer

A new $3\frac{1}{2}$ BT anti-friction, worm-on-top gear speed reducer for continuous duty installations in the fractional horsepower field is announced by Winfield H. Smith, Inc., Springville, Erie Co., N. Y.



The worm is of hardened steel with ground threads; keyed to the shaft which is mounted on radial-thrust type ball bearings.

Oil seals of built-in-type are pro-bronze.

Oil seals the built-in-type are provided on all shaft extensions.

It is rated at $\frac{1}{4}$ h.p. with a torque capacity of 140 to 190 inch-pounds. Ratios are 58, 36, 18 and 9 to 1.

The unit is $6\frac{1}{2}$ " high overall. Base is $4\frac{1}{8}$ " wide by 5" long. Weight is 15 lbs.



McMAHON Adjustable Angle Plate

For grinding any angle accurately.

Two sizes

Model "A" with T slots $3\frac{1}{2} \times 2\frac{3}{4}$ \$1.2.

Model "B" with tap hole $6x7\frac{1}{2}$ \$3.0.

Desirable territory open for dealers

142 JUNE ST.,
DAYTON, O.

FRANK McMAHON CO.,

Hardinge Offers New Model

The modern machine tool described here means that Hardinge will no longer use the term "Hand Screw Machine" as they have correctly named their latest model "High Speed Precision Second Operation Machine." This new model is said to be a complete refinement of previous machines and a proven machine to fit into present production programs, from batteries in production departments to one or more machines in experimental or laboratory departments.

Secondary operations, in many cases, are the final finishing or exact sizing operations performed on a partially completed part. The finishing or sizing operations should be performed on a precision machine designed for such operations. It is asserted that many organizations today are attempting to produce precision second operation work on obsolete equipment or to use a machine out of proportion with the work, resulting in scrap in sizing; poor finish; short tool life; longer set-up time; inconvenient operation and in general, smaller production.

Some of the features offered by this new unit are:—enclosed head with pre-loaded ball bearing spindle construction—electrical driving unit with mul-



LITTELL Air-Blast Valve for Faster Safer Production



PAYS its cost in a few weeks time in
—increased production—greater safety—economy of air. Automatically ejects pieces. Operator's hands are never in danger zone. Quickly adjustable air nozzle.

Automatic Roll Feeds—

dial feeds, magazine feeds, hopper feeds, for punch presses. Reels for coiled stock. Send for Circulars.

For Machine and Tool Work & Quick Set-Ups

The only 3-way reading precision indicator. Accurate in either direction. Feeler mounted in centered cone bearings. .014 reading. New improvements.

Price \$5.00

Write for folder.

J. R. Reich Manufacturing Co.
334 Triangle Ave., Dayton, Ohio

F. J. Littell Machine Co.
4153 RAVENSWOOD AVE., CHICAGO, ILL.

**THE
NEWEST
in
CUTTERS
★ ★ ★ ★
The
"WONDER"**



**CUTS—Wire and rods up to $\frac{5}{8}$ in.
CLIPS—Band iron up to $\frac{1}{8} \times 2$ in.
MEASURES—Length of pieces.**

The lowest-priced wire and band cutter on the market. Every shop, big or small can use a WONDER CUTTER.

*Write today for
further information and prices.*

The Federal Foundry Supply Co.
4602 East 71st St., Cleveland, Ohio

BURKE

MILLING MACHINES
Make Fast Work of Small Jobs

Motor
Driven

Timken
roller or
ball bear-
ings to
spindle

*Write today for
circulars.*



Burke Machine Tool Co.
297 E. 16th St., Conneaut, Ohio

ti-speed motor, eliminating gears, clutches and loose pulleys—convenient lever speed control at headstock and the welded, all steel pedestal.

The ample bed rests on three spheres to guard against distortion.

The preloaded spindle bearings are fully enclosed in an inner chamber, excluding foreign matter from entering at front or rear. Rear of spindle carries a double vee pulley for two endless vee belts from driving unit. The belts may be applied or removed without removing headstock spindle or bearings.

The automatic collet closer permits rapid opening and closing of the collets or step chucks while spindle is at speed or stopped. Collets are easily opened by moving the conveniently located lever from left to right. The closer is adjustable so that any desired collet or step chuck tension may be applied on part being machined.

The double tool cross slide is rugged. Tool blocks, as well as tool bit holders, are adjustable. Positive stops assure accurate cross slide forming. Standard circular form tool holders may be applied to the adjustable block in place of the tool blocks.

The tilted hexagon turret provides rigidity and clearance for tools. The six position head is automatically indexed and locked into position by moving operating lever to extreme right, at the same time, the six independent turret stops are indexed. The six position turret head adapts standard turret tools.

The two levers at the headstock end control Low-Stop-High and Forward-Brake Stop-Reverse spindle speeds through the operation of electrical motor controls. A metal chart, at front, shows speeds obtainable from the driving unit. There are eight forward and eight reverse speeds ranging from 230 to 3900 r.p.m. Chip pan is of proper design so that chips can be readily removed. Pedestal has built-in coolant system.

The machine has a 1" collet capacity, 6" step chuck capacity and 9" swing. A new bulletin is available from Hardinge Brothers, Inc., Elmira, N. Y.

A New South Bend Lathe

A new series "S" tool room lathe announced by the South Bend Lathe Works, South Bend, Ind., has a number of attractive features. This 16" swing underneath belt motor driven precision lathe is made in 6', 7' and 8 ft. bed lengths, having distance between centers of 34", 46" and 58". The headstock has 1-3/8" capacity through spindle and takes collets up to 1" capacity.

A convenient arrangement of controls saves time and effort, reducing operator fatigue and assuring maximum production. Large diameter hand wheels facilitate precision adjustments on close tolerance work. Adjustable micrometer collars on cross feed screw and compound rest screw are large in diameter with clear-cut, easy to read graduations.

Tool room attachments supplied include hand wheel type draw-in collet chuck, telescopic taper attachment, micrometer carriage stop, thread dial indicator, and chip pan. An electric grinding attachment, milling and other attachments, chucks and accessories are supplied to order.



The telescopic taper attachment is permanently attached to the lathe carriage and is always ready for use, regardless of the carriage position. To engage, it is only necessary to tighten two binding screws. The telescopic cross feed screw eliminates the necessity of disconnecting the cross feed nut when taper attachment is to be used. The cross feed screw may be used to adjust the turning tool for the



SAFETY SOCKET
4445 N. KNOX AVE.



SCREW CORPORATION
CHICAGO, ILL.

**Double
Heat Treated
Completely
Cold Formed
Drawn to a Fine
Chisel Blue**

**BLUE
DEVILS**

AT YOUR COMMAND



4 SPEEDS

Shaper operation is made more flexible — more efficient with a SCHULTE'S Four Speed Drive—with just the right speed for the job—at Your Finger-Tip.

The modern drives are equally valuable for lathes, milling machines, drills or punch presses. They're low in first cost and easily attached. Soon repay their cost through savings which they make possible.

Schulte's Drives incorporate all the latest engineering improvements and advantages. They're dependable, economical to operate and maintain, and will show definite savings in production costs.

*Write for bulletin
giving complete information*

Westlief Tool & Die Co.
428 Bellevue Ave., Detroit

required diameter, and the taper attachment may then be engaged. To change back to straight turning, it is only necessary to loosen the two binding screws.

The drive provides eight spindle speeds ranging from 21 to 725 r.p.m. Smooth operation at high spindle speeds is achieved by using a direct belt drive to the carefully balanced cone pulley and spindle assembly. Motor and driving mechanism are mounted in cabinet leg under headstock, and the cone pulley belt passes up through bed to headstock. Back gears provide slow spindle speeds and ample power for machining large diameters. A convenient belt tension releases lever and wrenchless bull gear lock permit rapid changing of spindle speeds.

A full quick change gear mechanism provides a series of 48 power longitudinal carriage feeds .0015" to .0841", a series of 48 power cross feeds .0006" to .0312", and a series of 48 right and left hand screw threads from 4 to 224 per inch.

All Roads Lead To
COMFORT
IN
DETROIT

500 ROOMS
All With Tub & Shower

\$1.50
from

FRANK WALKER
Manager

HOTEL
WOLVERINE

**the hotel
preferred
hotel
metropole**

a stopping place modern in every detail, yet maintaining a friendly atmosphere and hearty hospitality • preferred by experienced travelers • dining room • garage adjacent • rooms from \$1.50 • with bath from \$2.50

**cincinnati
ohio**



**NEW!
CENTER
GRINDER
and
DRILL PRESS**

Two machines for the price of one! Easily changed from a Center Grinder which dresses angle accurately and assures accurate grinding to a sturdy, accurate Drill Press of $\frac{1}{2}$ -inch capacity. Floor type, any length, complete with motor, diamond and grinding wheel. Four speed V-belt drive.

\$19750 Standard grinder, 40° between centers, complete with 110-220 volt motor.
F.O.B. DETROIT
Write for Bulletin No. 11

DALZEN MANUFACTURING CO.
511 LEIB ST. DETROIT, MICHIGAN

ESCO DRILL JIGS



ARE

- RAPID CLAMPING
- QUICK LOADING
- EASIER TO OPERATE
- LOW IN FIRST COST

AND WILL

- SAVE DESIGN COST
- SPEED UP PRODUCTION
- LOWER OPERATING COSTS

PURCHASE FROM STOCK.

ESCO ENGINEERING & SALES, Inc.

4855 Fourth Ave.,

Detroit, Michigan



Grind Your Drills On
"BLACK DIAMOND"
 Precision Drill Grinder



Even an unskilled operator can do a precision job of drill grinding—handles sizes from No. 60 wire gauge to $\frac{3}{4}$ "—easily, quickly and without any complicated adjustments. Saves time, drills and possible damage to the work.

Let us send you Bulletin No. 121-H.

BLACK DIAMOND

SAW & MACHINE WORKS, INC.
 NATICK, MASS.

HALCO UNIVERSAL HEAD

FOR HIGH SPEED
 MILLING, DRILLING, BORING
 AND COUNTER BORING ON ANY ANGLE

PRICE \$195.00

With 10 Speed Back Gear

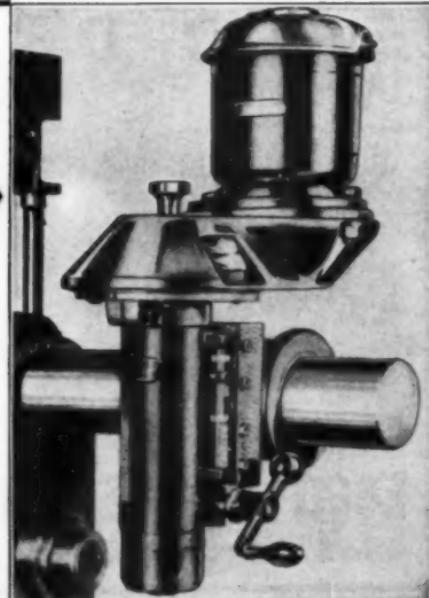
\$47.50 Extra

Sold direct, factory to you, or your nearest dealer. Many machines in use. Tried and tested in machine plants for 1-1/2 years. Each head is unconditionally guaranteed for six months.

Write for folder giving details or order
 now for quick delivery.

HALCO PRODUCTS CO.

14238 Birwood Ave., Detroit, Michigan



Elgin Adds a New Model

An attractive and useful new model has been added to the line of lathes made by Elgin Tool Works, 1772 Bertrand at Ravenswood Ave., Chicago, Ill.

It is a standard enclosed head type unit, mounted on a substantial cast iron pedestal base. The entire assembly is sturdy and rigid, preventing vibration at higher operating speeds.

An attractive feature is found in the drive. Belts may be changed without dismantling any parts of the head or drive units.

Eight speeds are provided, ranging from 230 to 3900 r.p.m.

Collet capacity is one-inch. Swing is 9". Distance between centers is 17". Spindle is mounted in preloaded precision ball bearings.

A handy feature is the rack for collets, inside the front pedestal door. Can be furnished complete with coolant pump. Attachments such as turret head, cross slide and automatic chucking closer are available for converting the unit into a precision hand screw machine.



Wardwell No. 57T Grinder

The Wardwell Mfg. Co., 3165 Fulton Road, Cleveland, Ohio, has developed a grinder designed for automatically sharpening form milling cutters and metal cutting saws in gangs, from 2" to 8" in diameter and up to 3 $\frac{3}{4}$ " in thickness, with spacing of teeth up to 1 $\frac{1}{4}$ " from point to point.

INFINITE SPINDLE SPEEDS

Ranges: 90 to 180 R. P. M.
180 to 3600 R. P. M.

**Motor Driven—1" wire feed—
6 $\frac{1}{2}$ " turning length.**

This NEW No. 2 Turret Lathe offers any spindle speed from 180 to 3600 R. P. M. instantly. It will handle a wide variety of work at low cost and is designed particularly for the use of modern cutting tools.



Send for copy of Bulletin No. 629 giving detailed information.

MOREY MACHINERY CO., Inc., 410 Broome Street, New York City

UNAPPROACHED AIR VALVE PERFORMANCE

Leak-proof—Saves air. Accurate control. Easy to use. No packing glands. No external buttons or levers. All working parts enclosed. Amazingly simple construction made possible by patented enclosed actuating lever attached to valve by ball and socket joint. Thousands used in most modern plants.

Patented
May, 1939

Try the Air-O-Chek

Get acquainted with the Air Valve that's different. Order sample on approval.

Air-Way Pump & Equipment Co.
401 S. Jefferson St. Chicago, Ill.

REMOVE BROKEN TAPS

Quickly--

Insert WALTON Tap Extractor and back out broken piece. No annealing—no drilling.

Easily--

Tap Extractor and Tap Wrench are only tools needed.

Safely--

Threads are not damaged. Not necessary to tap oversize after broken tap is removed.



Folder 131 gives complete details.

THE WALTON CO.
95 Allyn Street Hartford, Conn.

This machine automatically indexes the gang of saws, one row of teeth at a time, with the grinding wheel shaped to suit the gullet of the tooth. It is claimed to sharpen a gang of saws within a variation of plus or minus .001" of exact diameter of the entire lot.

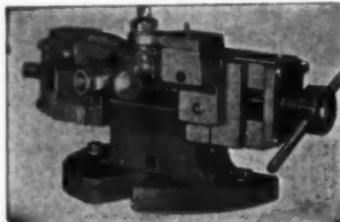
A group of 250 saws .015" in thickness can be sharpened at one time.



The frame is a rigid one-piece casting. Grinding wheel head has a long and unusually large grinding wheel spindle, mounted on one end on grease-sealed ball bearings. Other end is carried in two Timken bearings, adjustable and sealed to exclude dust and grit.

Grinding wheel head is fitted to frame in dovetail slides and is gibbed for adjustments. Wheel is fed down into work. Saw arbor is fitted to a hole in an adjustable cross slide, fitted to dovetail ways on a knee of the horizontal slide. Horizontal slide reciprocates under grinding wheel on protected dovetail slides, gibbed to take up wear. Cross slide is adjustable so any hook of tooth may be obtained.

The reciprocating slide is operated by an adjustable eccentric, adjustable for



HEUSER MFG. CO.,

"JOHN'S" Drill Jigs Are Used in the Following Industries . . .

Automobile and truck mfrs., automobile accessory & parts mfrs., electrical mfrs., farm machinery mfrs., hardware, locks, machine tool mfrs., meters and instruments, motorcycles, pumps, railroad equipment and supplies, stoves and ranges, washing machines, screw machine products, valve mfrs., and many others.

Send us blueprints for our tooling layout suggestions.

1638 N. Paulina St., Chicago, Ill.

a stroke up to 5". Eccentric shaft is provided with a clutch which may be disengaged for adjustments. The slide travels at a speed of 20 strokes per minute, and may be speeded up through a variable speed V-pulley on motor.

The saws are automatically fed though an index plate, fastened at other end of saw arbor.

The machine can be furnished, belt or motor driven—also with or without pedestal. Coolant pump is furnished only with pedestal type.

Carbon Brush Concaver

It should be easy to form brushes to the commutator curvature with a new device just announced by the Ideal Commutator Dresser Co., 1441 Park Avenue, Sycamore, Ill.

The old brush is used as a template to locate the arc segment on the cutting guide slot, which arc corresponds to the contour of the commutator or slip ring. After this segment is found the new brushes may be formed with-

out further set up.

Any electric drill or electrical shaft drive may be used to operate the cutting head. The complete unit includes



aluminum guide casting, cutting file, removable angle plate with clamping device and "C" clamp. Takes practically any size brush for 4" to 48" diameter commutator.



Motorize Your Tools with H & Z Motor Drives

Speed up production, increase plant efficiency and lower costs by equipping your machine tools with H & Z Motor Drives. Specially designed to meet particular needs.

H & Z engineers are prepared to survey your plant, submit recommendations and make installations without interrupting production.

Write for particulars.

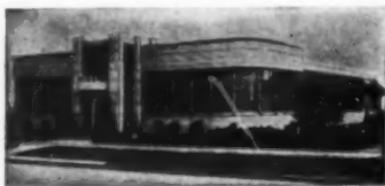
HERTZLER & ZOOK CO., Belleville, Pa., Pioneers Since 1925



Cams for Screw Machines
48 hours' service

BANNER MANUFACTURING CO.
1871 Clybourn Ave.
Chicago. Ill.

**Now In Our New Plant
9350 GRINNELL AVE.**



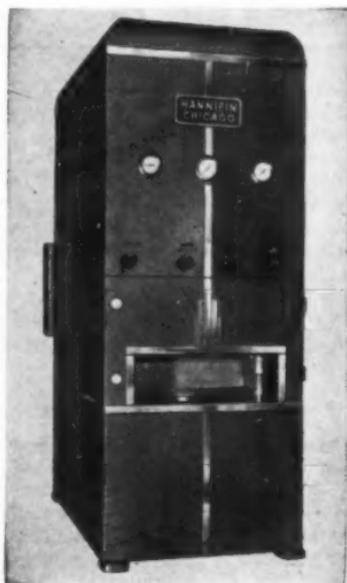
**KΔEBELITE
DIAMOND TOOLS**

*
**Deliver a Known Quantity
—and Quality of Service**
*

**KOEBEL DIAMOND
TOOL COMPANY
DETROIT**

**Hannifin Centrifugal
Quenching Machine**

Accurate and controlled quenching of circular parts of all kinds with a material saving in quenching time—these are some of the highlights of the new centrifugal quenching unit announced by Hannifin Mfg. Co., 621 So. Kolmar Ave., Chicago, Ill.



Designed for quenching gears, sprockets, disc, flat cams, rings, bearing races and similar work, a large volume of quenching fluid is applied at uniform,



**Mill Over 1,000 Parts Per Hour
WITH THE
NEW Dearborn Automatic Chucking
and Indexing Fixture**

Work held by draw in collets. Collets open and close automatically. Work automatically ejected. Indexes without loss of time for milling 1, 2, 3, 4, 6, 8, 12 or 24 sided pieces. Minimum set-up time required. Speeds up production. Positive and accurate in operation.

J. W. DEARBORN
72 S. CLIFF ST. ANSONIA, CONN.

controlled temperature, which is claimed to reduce distortion by applying coolant to the entire circumference simultaneously, with progressive quenching toward the center of the piece. It is asserted that the automatic operating cycle is 4 to 5 times as fast as other available methods.

In operation, the heated part is placed on the lower fixture in the machine. This, and removal at end of the automatic cycle of operation constitutes the only handling required.

The holding fixtures are designed to meet individual requirements of the parts to be quenched. The holding fixture is surrounded by a circular quenching chamber which opens in two parts with the fixture, and when closed, provides a circular vessel for the quenching fluid. When closed the entire assembly of quenching chamber, holding fixture and hot part is rotated by a motor drive. Quenching fluid is introduced at the outer edge of the revolving container. Oil is introduced in controlled volume and accurately controlled temperature. Rotation and con-

trol of volume produce a revolving "doughnut" of quenching oil around the circumference of the chamber. As volume is increased, the hole in the doughnut is reduced and quenching action takes place from circumference toward the center.

The complete cycle of automatic operation is said to range from 40 to 60 seconds for representative examples of gear and sprocket quenching, where former methods required 4 to 5 minutes.

Bulletin No. 55 gives complete information.

Aircraft Bearings

The "AE" series of aircraft bearings made by Shafer Bearing Corp., 35 E. Wacker Drive, Chicago, is presented in bulletin No. 531. Engineering information and specifications are given, along with drawings of retractable landing gear and aileron controls. The new "AE" series provides large load capacity and extreme self-aligning action in a very compact bearing.

GRINDING WHEEL DRESSERS—VISES

We manufacture the only complete line of Grinding Wheel Dressers and cutters and will gladly suggest the proper one for your wheels.

The exclusive solid steel slide makes Simplex Vises stronger and more serviceable.



Desmond Heavy-Duty Dresser



Simplex Machinists' Vise



Desmond Diazo-Carbo Dresser, best tool room dresser.

Write for catalog H showing complete line of Desmond Dressers and Simplex Vises and name of your nearest dealer.

DESMOND-STEPHAN MFG. CO., URBANA, OHIO

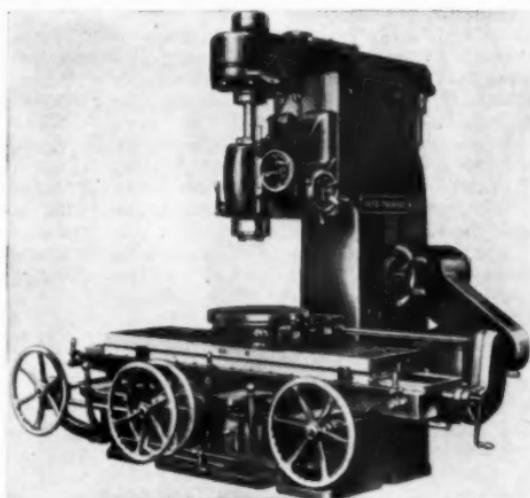
Canadian Desmond-Stephan Mfg. Co., Ltd.—Hamilton, Ont.

Vertical Miller with Gear Drive

Reed - Prentice Corp., Worcester, Mass., announces a No. 6 Vertical Milling Machine and Die Sinker with positive gear drive to spindle; top box being totally enclosed and dustproof. Anti-friction drive is derived from main driving pulley to spindle through the use of Timken roller bearings.

In the machine designed, emphasis was placed on maximum power and rigidity. The saddle extends full length of table, giving rigid support for heavy work. High operating efficiency is obtained through power rapid traverse to table in either direction at 95" per minute.

Table working surface is 72" x 20". Working surface of rotary table is 24" in diameter. There are



12 spindle speeds ranging from 15 to 500 r. p. m. and eight feeds for each spindle speed. A 10 h.p. 1200 r. p. m. motor is recommended. A new bulletin gives complete information.

Bates Acromarker

A handy new numbering and lettering machine should be useful in marking parts, pieces and nameplates in connection with the defense program.

The die wheel carries a full alphabet and a full set of figures also dash, diagonal line, comma and period. Each die is of heavy duty type, machine

BAUMBACH

STANDARDIZED

DIE SETS

Machined Steel Semi-Steel

Drop Forged Steel

Headquarters for Standardized Die Sets, embodying many exclusive features and embracing more than 195,000 stock sizes and 46 different styles. A die service that is unsurpassed. Let us prove it!

Send for our new 336 Page Catalog.

E. A. BAUMBACH MFG. CO.
1810 So. Kilbourne Ave., CHICAGO, ILL.

Accurate Hole Transfer Made Easy With NIELSEN TRANSFER SCREWS



Simply insert in holes, invert, strike sharply and you have centers and drill circles perfectly located. Reduce time and eliminate spoilage of other methods. 7 sizes U.S.S.—Inexpensive—last for years.

Write for Circular
**NIELSEN TOOL &
DIE COMPANY**
1859 Gardner Ave.
Berkley, Mich.

PILLOW BLOCK Balancing Ways

These Anderson Pillow Block Balancing Ways are made with the same care and materials as are our other Balancing Ways. The same extremely accurate balanced spindles and chilled iron discs are used.

The Pillow Block type of Balancing Way is especially suited for large diameter work, as a sub-base can be made of proper height to give necessary clearance for work.

They are built to give long satisfactory service. Outstanding manufacturers have endorsed them for profitable, efficient, static balancing.

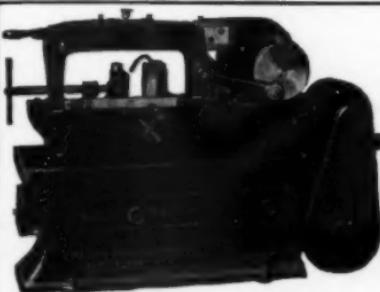
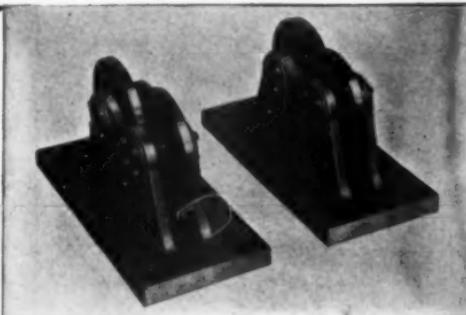
Built in 1000, 2000, 5000, 10,000 and 20,000 pound capacities.

May we send you more information and details?

ANDERSON BROS. MFG. CO.

1907 KISHWAUKEE ST.

ROCKFORD, ILL.



W-3B "RACINE" Wet Cut Utility Saw,
6" Capacity.

Available in two types—the Wet Cut Model and the Dry Cut Model—6"x6" Capacity.

Tear out the attached coupon and get our free catalog No. 70A. You will be surprised to learn of the savings to be made using these modern RACINE machines.

The most complete line with
RACINE Heavy Duty Hydraulic Saws 10x10 to
14x20
RACINE "Shear Cut" Screw feed Saws 6x6 to
8x9
RACINE Hydraulic "Oil Cut" 6x6
RACINE Utility Saws 6x6 and Racine Duplex
Bandaws.

"STANDARD THE WORLD OVER"
RACINE TOOL & MACHINE CO.
1754 State St., Racine, Wis.

RACINE

High Speed Metal Cutting Machines HYDRAULIC UTILITY SAWS

Here are moderately priced saws designed to handle your general shop cutting in the most efficient and fastest manner. These Utility saws contain those advantages of Hydraulic feed and control formerly found only in expensive production machine tools.

Hydraulic operation reduces moving parts to a minimum—no friction drives, ratchets, or screws to wear or cause horse power loss. RACINE Utility saws prolong blade life because of their smooth oil-cushioned operation. Their sturdy, rugged construction gives you the fastest, most accurate cutting with the least cost.

Please send me catalog No. 70A on RACINE Utility Saws. Also general catalog on complete line.

Name _____

Company _____

Street _____

City _____ State _____



The worker who lifts heavy burdens at his work and goes home tired and depressed places an unseen weight on the minds and spirits of his family.

A "Budgit" Hoist would make a happier more productive worker and save money for his employers.

"Budgits" are portable, electric hoists that are hung up and plugged into any electric socket. They come in sizes to lift loads up to 250, 500, 1000 and 2000 pounds with speeds to suit today's tempo. Prices start at \$119.

Send for catalog containing complete information, also, "Time Savings Calculator" that shows savings they earn.



"BUDGIT" Hoists do the lifting at the drill presses for this machining department.

'BUDGIT' HOISTS

SHAW-BOX CRANE & HOIST DIVISION

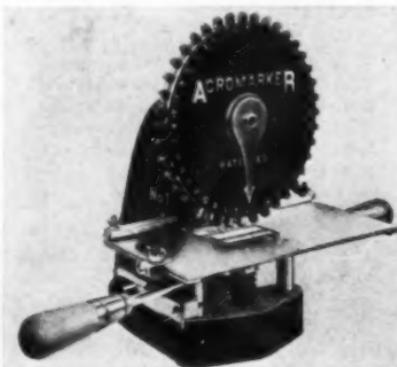
MANNING, MAXWELL & MOORE, INC.

435 BROADWAY

MUSKEGON, MICHIGAN

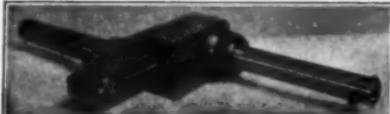
Makers of all types and sizes of Electric and Hand Operated Cranes and Electric Hoists . . . Send all your crane and hoist inquiries to Shaw-Box!

engraved and hand finished, tempered and tested. The holding fixture receives a name plate up to 8" by 4-3/4" and permits stamping within an area of 5" left to right by 3-1/4 top to bottom by .000 to 5/8" thick.



The die wheel rotates on a double row SKF precision roller bearing, with a positive stop positioning for each character. At each stroke of the hand operating lever the table can be advanced for each full space or any portion of a full space at a single stroke. This is of particular advantage where varied spacing or the spacing of a narrow letter such as "I" is necessary. The powerful screw pressure principle permits stamping of steel, stainless steel and alloy steels and the dies are said to withstand such service.

It is made by H. O. Bates (The Acromark Co.) 259 N. Broad St., Elizabeth, N. J.



MODERNIZE present equipment with a RUSSELL BORING BAR. Bores 9/16" to 12" dia. with boring axis parallel to shank axis. One compact tool, with micrometer adjustment.

**RUSSELL BORING BAR CO.
MIDDLETOWN, OHIO**

Eccentrics for Erickson Chucks

Erickson Precision Chucks have now been adapted for use on automatic screw machines. A simple multi-purpose set of eccentrics is now available.

Fitting a pair of eccentrics over the shank, an operation which is instantaneous, the chuck is ready to fit the automatic.

A patented hexagon principle is said to make centering unusually simple as

the hexes serve as measure, each hexagon having an eccentricity of .005".

Another advantage lies in the elimination of bushings and the expense they involve not to mention stocking and caring for them. The Erickson Chuck Collets are capable of collapsing 1/32" to 1/2".

Faster feeds and more accurate holes are claimed possible, since twist drills, reamers and other tools may be set

Eklind

UNIVERSAL MILLING HEADS

TURCHAN

HYDRAULIC DUPLICATING ATTACHMENT

The MODEL 4 H EKLIND TURCHAN Hydraulic Duplicating Unit, is designed and priced for the average range of work in die shops making Bakelite, Plastics, Rubber and drop forge molds and dies. Oil pressure controlled by tracer feeds the spindle and tracing arm to follow the model. Die capacity 16" long by width, depending on cross feed of machine. Can increase capacity still more by mounting head on side of overarm.

THE MODEL 4 H EKLIND Universal Milling, Drilling and Boring Head is a most valuable tool room aid. It is offered separately and the duplicating attachment can be added later.

Write today for circular

UNIVERSAL HIGH SPEED TOOL CO.
549 W. WASHINGTON BLVD. CHICAGO, ILLINOIS

TIME AND TROUBLE SAVER

Howell Adjustable Clamps

High Speed—Simply Operated—Extremely Flexible and have Wide Range.

Send for Circular.

Howell Clamp Co.

1373 E. 95th St.

Cleveland, Ohio



This One Compact Machine
Will Keep Your Carbide Tools
In Perfect Working Condition



Universal Carbide Tool Grinder

Every operation necessary for the upkeep of cemented carbide tools can be performed on this machine. Its simplified operations save 30 per cent of the time otherwise spent in sharpening tools which—in turn—returns the cost of the machine in improved output.

Ask for Bulletin CTG40-12H.

K. O. Lee Company

Aberdeen, South Dakota, U. S. A.

to any desired length. The practice of shortening drills to prevent long hang-overs is eliminated for the chuck can grip on the flutes as well as on the shank. The shank of the chuck is hollow, allowing the drill to be set to any desired length.

The positive stop thrust screw in the shank can also be set for any length, assuring non-slipage, regardless of any thrust load.

All parts are guaranteed interchangeable with corresponding models and sizes. A comprehensive bulletin is offered by The Erickson Steel Co., E. 80th & Bessemer Ave., Cleveland, Ohio.

Power Hack Saws

Peerless Machine Co., 1600 Junction Ave., Racine, Wis., has published a meaty, new catalog on metal sawing. Although the standard line is given major emphasis other models listed include the huge hydraulic types with automatic bar-feed equipment.

Recommendations are made for the correct uses of high-speed steel blades in various kinds of steel, for cutting pipe, tubes, etc.

MICROMETER OFFSET BORING HEADS

No. 35

\$70.00



A New Flynn Micrometer
Offset Boring Head

Write for catalogue.

Boring Bars

The new small bars $\frac{3}{16}$, $\frac{1}{4}$, $\frac{5}{16}$ and $\frac{3}{8}$ in. dia. Set of 4—\$5. Larger bars up to $1\frac{1}{2}$ in. diameter.



Flynn Manufacturing Company

435 Bates Street Detroit, Michigan

WHITNEY-JENSEN

Nos. 58 and 68

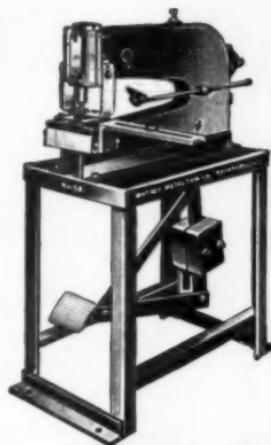
Foot Presses

For fast, semi-production punching operations. Capacity 2^{1/2} hole in 16 gauge. Can punch 100 pieces per minute. Sturdy and powerful. Works with an easy push of one foot.

No. 58 18" Throat Depth

No. 68 24" Throat Depth

Write for New No. 14 Catalog.



WHITNEY METAL TOOL COMPANY
115 FORBES ST., ROCKFORD, ILLINOIS

An Ounce of Prevention Is Worth A Pound of Cure

It's better to prevent an accident from occurring than to wait and try to do something about it afterward. Why not protect your workmen from fumes and dust *now?*

Keep workrooms and factories free from dust and fumes. The Berg Fume and Dust Collecting Unit is extremely flexible, and is quickly and easily moved to cover every spot within a circular space of 12 feet in diameter. The Berg Unit is constructed entirely of metal. Low in first cost and up-keep, and easily installed. Approved by State Department of Labor and Industries. Write for further details.

We install all kinds of dust collecting systems, and carry in stock new and rebuilt blowers and dust collectors.

C. F. BERG & CO.
72-74 Dedham St., Boston, Mass.



INTERCHANGEABLE PARTS

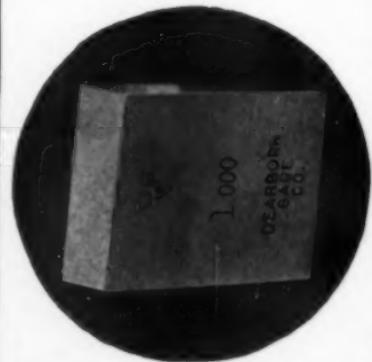
MUST BE GAUGED BY CONSTANT STANDARDS

Chromed Plated

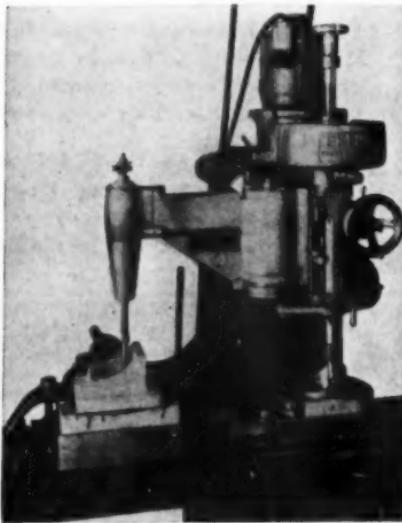
GAGE BLOCKS are the most reliable measurement standard

DEARBORN GAGE COMPANY*"Originators of Chromium Plated Gage Blocks"*

22035 BEACH STREET - DEARBORN, MICH.

**Trimming Mold and Die Costs**

Hydraulic reproduction from master models is saving time and money in the making of molds and dies. A typical application of this new, modern process is shown at the plant of a prominent rubber mold maker in Akron. In this case the mold cavity



was particularly deep — about $3\frac{1}{2}$ ". With the equipment shown, it is possible to duplicate a cavity of this depth at one setting of the table inasmuch as a $6\frac{3}{4}$ " vertical feed is available.

Prior to duplicating these molds by means of the Eklind-Turchan unit, it was necessary to make a costly series of templates from which to work.

A second illustration shows the extreme capacity of the unit. It is possible to mill a die, equal in length to the longitudinal feed of the milling machine—16" in this case.

The standard mounting is somewhat different from that shown.

A useful feature is the ready portability of the equipment. It can be installed on any standard milling ma-

MARSCHKE

Heavy Duty Grinders and Buffers

You know what a man means when he describes a job as "A DIRTY DAILY GRIND," but have you stopped to think that the term probably developed from observing ordinary services of Floor Stands, Swing Frame Grinders, Buffers and similar machinery?

You need a good machine for that kind of work. It must have "heft" but it also must have refinements of design for convenience and safety of operation and exacting execution of that design to exclude the dirt from motors and bearings.

That is one of the reasons for standardizing on MARSCHKE GRINDERS and BUFFERS.



A Catalog with seventy different Grinder and Buffer specifications will be sent promptly upon receipt of your request.

VONNEGUT MOULDER CORP.

1805 Madison Avenue

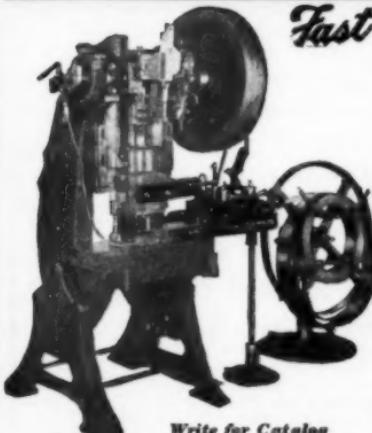
-2-

Indianapolis, Ind.

WITTEK ROLL FEEDS

FOR ANY MAKE AND SIZE OF PUNCH PRESS

Fast Safe Accurate Automatic



Write for Catalog

WITTEK MFG. COMPANY
4305 W. 24th Pl. Chicago, U.S.A.

Keep up with production schedules, yet keep costs down by installing Wittek Automatic Roll Feeds—the feeds that have made automatic punch press operation practical on even comparatively short runs.

They can be installed on any make or size punch press without alterations . . . will handle any coiled stock and feed from right to left, left to right, back to front or front to back in any length from 0° to 24° per press stroke at catalog speed or faster.

Improved Operating Principle

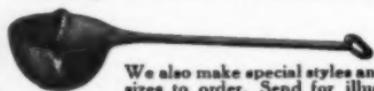
Improved, simplified method of operation insures rapid smooth, accurate feeding. Made in 3 types, Wittek feeds save dies, reduce scrap and cut maintenance costs to a minimum.

WITTEK ADJUSTABLE REEL STAND

6 types—a type for every job. Will handle any stock (metal, foil, paper, etc.) Wittek No. 3 (illustrated) has automatically expanding coil holders that center the coil and assure maximum production by eliminating looping, tangling and backlash of stock.



Salem Pressed Steel Ladles Melting Kettles & Skimmers



We also make special styles and sizes to order. Send for illustrated bulletin today.

THE SALEM TOOL CO.
SALEM,
OHIO

Toledo Variable Speed Transmission for

Variable speed control of V Belt driven equipment



*Low in Cost
Easy to Install
Convenient Size
Simple to Operate
No Belts to Shift
Infinite Speed Selection in Stepless Speed Changes*

Types 1A and 2A
Provide up to 3 to 1 Ratio With Power Ratings from Fractional to 4 H. P.

Other Types Available to Provide Speed Changes up to 10 to 1 Ratio.

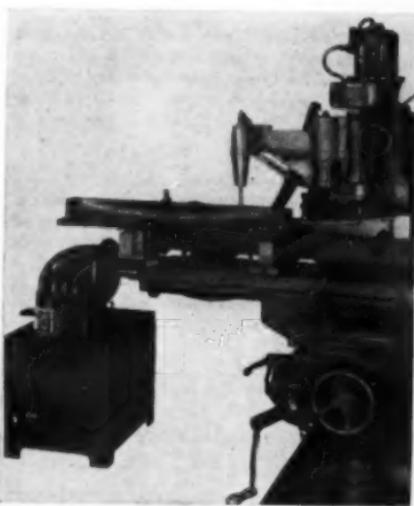
All Types Available Either In Complete Assembly or Wheel Assembly Only.

If you have a variable speed requirement it will pay you to investigate these devices.

Write for literature and quotations.

THE TOLEDO TIMER CO.
2224 Albion Street, Toledo, Ohio

chine. The hydraulic arm can be disengaged and the head used for straight milling, drilling or boring operations. It will accommodate end mills from $\frac{1}{8}$ " up to $\frac{3}{4}$ ". It may be swiveled to any



angle and the unit is entirely self-contained, operating from any light socket. There are six speeds—250 to 4000 r.p.m.

A bulletin giving full details may be obtained from Universal High Speed Tool Co., 549 W. Washington Blvd., Chicago, Ill.



GOOD NEWS! for DIE MAKERS

**Transfer Points Eliminate
Guesswork in Die Making**

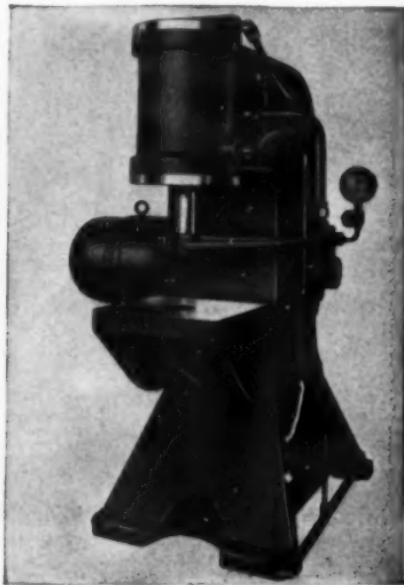
There's no chance for error when you use transfer screws as markers in setting dies. Points are of uniform height above hex base. Six accurately made and hardened screws nest in a special holder with hex wrench tip. Made in $\frac{1}{4}$ " to $1\frac{1}{8}$ " diameters.
 $\frac{3}{16}$ " \$1.50 per set $\frac{5}{16}$ " \$1.25 per set $\frac{7}{16}$ " \$1.40 per set
 $1/4"$ 1.20 " $3/8"$ 1.35 " $1/2"$ 1.50 "

HEIMANN MFG. CO.,

URBANA, OHIO

Greenerd Announces New Presses

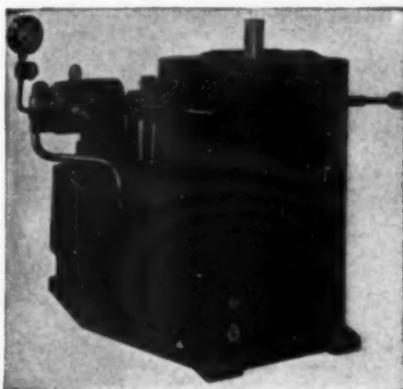
Two new presses will be marketed soon by the Greenerd Arbor Press Co., of Nashua, N. H.



A 30 ton push type, No. H-70, is self-contained and is distinguished by the location of motor and pump, mounted on opposite sides of the main housing.

Highlights of this new press include: —a 9" piston with six cast iron piston

rings; a working table 18" wide by 15" deep; and a ram adjustable from one to 10".



The ram has a rapid traverse speed up to 15 tons pressure and instantaneous change-over for lower speeds and higher pressures. This new press is equipped with a 10 h.p. motor and starter while a different model of the same machine, No. H-70-CD, has a five h.p. motor and a smaller pump.

A new pull type press, No. H-70-P, also exerts 30 tons pressure and is self-contained. It has a table diameter of 24"; stroke is adjustable from 5½ to 22½". This press is also operated by a 10 h.p. motor and starter.

These two new types help to round out the complete line of presses offered by Greenerd.

WIREGRIP

STEELGRIP

ARMSTRONG-BEATY & CO.
"The Belt Lacing People"
315 N. Loomis St., Chicago,
U. S. A.

WIREGRIP Belt Hooks — 6 sizes of tough hooks conveniently carded. No waste. Makes smooth humpless flexible joint on all flat belts.

STEELGRIP Lacing — 8 sizes, applied with a hammer. For all flat belts on tough drives. Prevents end fraying.

Here at one source are all belt lacing needs, dependable satisfactory products of guaranteed material and workmanship. Write for Catalog.

\$25 BUYS A POSTEL (f. o. b. Minneapolis) DIE FILER

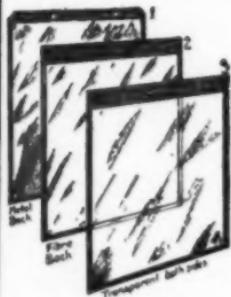


A dependable, precision tool that will soon pay for itself.

Write for full information

The Postel Filing Mch. Co.
915 Washington Ave., So.
Minneapolis, Minn.

Protect Shop Orders, Drawings, Blueprints...



with
WADE
Shop
Envelopes

Any size or style to order, stiff or flexible, to suit your requirements.

Send for folder and quotation.

WADE INSTRUMENT CO.
1422 E. 109th St.,
Cleveland, O.

Hammond Absorbs New Lines

Hammond Machinery Builders, Kalamazoo, Mich., announces the purchase of the Automatic Polishing and Buffing Machinery Division of the



Continental Roll and Steel Foundry Co., East Chicago, Ind., and its removal to Kalamazoo.

The Continental Automatic Line complements the Hammond Line of larger Rotary and Strait Line Automatic Polishers and Buffers, as well as Hammond's complete line of all types of Polishing and Buffing Lathes (or Jacks) and Grinders. This is assured to result in the widest combined line available.

Continental successfully introduced the Loose Abrasive Method, which is particularly valuable in the finishing of stainless steel, steel stampings and drawings, as well as odd shapes and contours.

G. E. Offers New Selector Control

A new selector control for maintaining constant temperature and humidification control in process air conditioning has been announced by General Electric Co., Schenectady, N. Y. It is



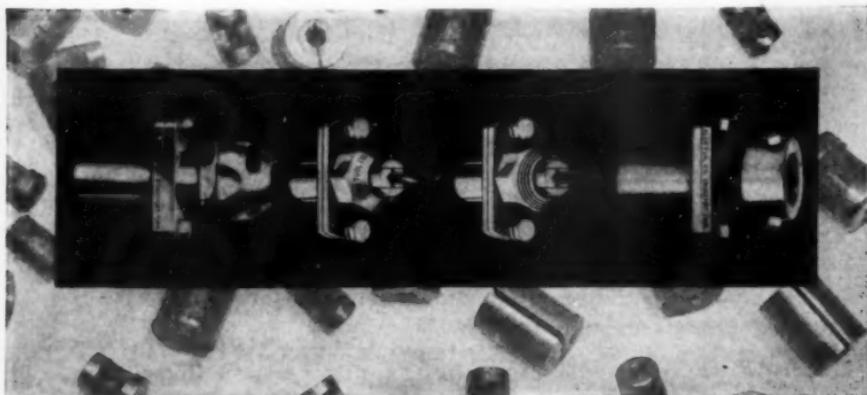
RED HEAD

ETCHERS and DEMAGNETIZERS

Let us tell you the many advantages of our new D. C. and A. C. models now available. Also, see our new line of Magnetic Parallels and Midget Chucks.

Send TODAY for latest circulars

PRINTZ ELECTRIC CO.
14595 KENTUCKY AVE.,
DETROIT, MICHIGAN



A Blackout for Bushings—

How many times have you wished that you could line up and adjust your drills, taps, or dies without having to use bushings? The floating feature, found only in ALCO Tools, enables you to make that wish come true. The adjustment is simple, speedy and positive. Absolute concentricity is assured—on old or new machines. Broken drills and taps are reduced to a minimum; also expensive rejections on account of imperfect holes or defective threads. And, since no bushings are required with ALCO Drill Chucks or Tap Holders, your bushing headaches become a thing of the past. Write today for full particulars or that we have our representative in your locality call on you. **Alco Tool Co., 835 Housatonic Ave., Bridgeport, Conn., U. S. A.**

ALCO TOOLS

A CLAMP for Every Purpose



**Forged Steel
Quick Acting
Deep Reach
Welders**



Sizes Available:
 $\frac{3}{4}$ " to 10" opening
 $\frac{1}{2}$ " to 16" deep

Write for CATALOG and PRICES on Clamps for all purposes
as well as many other tools for use in the Machine Shop.

IN STOCK AT YOUR SUPPLY HOUSE

The Cincinnati Tool Co.,

**1945 WAVERLY AVE.,
CINCINNATI, OHIO**

NUMBERALL Numbering Machines

Automatic and Hand Operated

for stamping in Metal, Fibre, Plastics, etc. Do faster and better work than Single Steel Stamps.

For Marking Metal Parts, Name Plates, Metal Checks, etc.

Write for Catalog.

NUMBERALL STAMP & TOOL CO., Inc.
Huguenot Park, Staten Island, N. Y.



Hartford Bench Taper Gage



This gage has been developed to not only meet tool-room requirements, but manufacturing requirements.

It is made in a most substantial manner of the best materials. The gage plates are hardened and ground. In operation the gage sets on a bench convenient to the workman. It is adjusted to the height of his eyes, and placed so that he looks toward the light through the gage. The gage plates are set to a master plug gage. It is found much more accurate and rapid to operate than a ring gage.

Height to center line of gage:
greatest, 30 $\frac{1}{4}$ in.; least, 23 $\frac{3}{4}$ in.;
weight, 23 lbs.

Capacity—From nothing to No. 14 Brown & Sharpe taper.

Built and sold by

The Hartford Special Machinery Co.
HARTFORD, CONN.

also entirely suitable for automatic year-round comfort control. This new selector-control unit, when used with a three-wire, "floating" type thermostat or humidistat, provides close control of temperature or humidity under widely varying conditions.

Outstanding features of the new device include a synchronous timing motor to assure accurate timing; control relays for single-pole, double-throw switching; conveniently located high-voltage and low-voltage terminals, and a trim, aluminum-finish case.

Handy Kennametal Chart

A new Kennametal tool room chart (No. 6), on which has been printed an inch rule and a protractor for measuring tool dimensions and angles, is offered by McKenna Metals Co., 135 Lloyd Ave., Latrobe, Pa. The new chart also shows a chip breaker design on Style No. 11 Kennametal tools for turning bar stock and forgings, as well as an efficient tool design for a facing tool for turret lathes. A copy will be furnished free upon request.

"ALIVE" Ball Bearing Centers



"They turn with the work"

Write TODAY—and let us tell you more about them.

MODERN MACHINE CORP.
323 Berry St., Brooklyn, N. Y.

AN INEXPENSIVE ABRASIVE BAND GRINDER



"Built Like A Machine Tool!"

The Hormel-M Grinder is sturdily built with a supporting leg under the grinding table to eliminate vibration and tipping due to pressure on belt. Ball bearing throughout, equipped with Alemite lubrication, complete with grease gun.

Write for illustrated folder on this and other styles and sizes.

WALLS SALES CORP.
96 Warren St., New York, N. Y.

Personnel

An emergency solution to the present shortage of skilled mechanics, tool and die designers and tool engineers, has been studied by the A. S. T. E. This technical organization of the men responsible for "tooling" not only the nation's industrial products but also the country's defense needs — has developed an emergency training program, national in scope.

Developed also has been a new four-year high school course as a long-term training program to prevent recurrence of the present national emergency and improve

employability in industry of high school graduates, while a college course is also under development.

The Society estimates that 75 percent of all high school graduates at present are unemployable — primarily because high school curricula are designed mainly as college preparatory courses, rather than being designed to fit graduates to seek employment.

Complete details of the emergency training program being recommended

INSIST ON A DREMEL MOTO-TOOL 100 TOOLS IN ONE WE INVITE YOU TO CHECK THESE FACTS

A DREMEL MOTO-TOOL OFFERS

- ✓ 27,000 R. P. M.
(The speed essential for good grinding and to conserve cutters)
- ✓ FULL BAKELITE SHOCK-PROOF HOUSING
- ✓ WRENCHLESS CHUCK
- ✓ PERFECT BALANCE

**MASTER MODEL**

Only

\$16.50

Compare, feature for feature, any of the small offhand grinders on the market, regardless of price, with a *Master Model Moto-Tool*. Then note that in addition to its many exclusive advantages the *Moto-Tool* is precision-built for precision work. Its armature is dynamically balanced to eliminate vibration. It has oil-less (oil sealed) bearings and built-in cooling fan. Air filter keeps out dirt and grinding particles. Weighs only 13 ounces. Operates on either AC or DC 110-120 volt current. Write for catalog of Dremel tools, equipment and special combination offers.

DREMEL MFG. CO.,**DEPT. 210-M****RACINE, WIS.**

are to be made available to industry, government, and educational bodies in the next few weeks as soon as final revisions are completed.

Fundamentally, the program, while national in scope, is designed to take care of immediate needs in each specific industrial community. The program calls for cooperative action on the part of industry, educational bodies, counties and municipalities, and state and federal agencies.

MADE OF ALLOY STEEL MILLED FROM BAR

SOCKET HEAD
CAP SCREWS



SAFETY HOLLOW
SET SCREWS

Try Them On Your Next Job!

ECONOMY
MACHINE PRODUCTS
COMPANY

5207 Lawrence Ave., Chicago, Ill.

New Britain UNIVERSAL VISE

Swivels 360 degrees horizontally,
100 degrees vertically, to
give any angle or com-
pound of
angles.



Write for
Further
Information.

NEW BRITAIN TOOL & MFG. CO.
NEW BRITAIN, CONN., U. S. A.

Marked Shim Stock

Thin shim stock supplied in slotted cartons by Laminated Shim Co., Inc., Glenbrook, Conn., now is furnished plainly marked in inches on its edge—from 0" to 100", with half-inch subdivisions throughout the 100-inch length—at no extra price.



Therefore the precision-thin metal can be conveniently pulled through the carton slot and cut off to the exact size required. Not only is waste avoided but the markings also act as a tell-tale signal, indicating when the roll is about used up. These handy packaged rolls of brass or steel shim stock (6" wide and available in .001 to .015 thicknesses) facilitate shim stock storage, prevent the stock from being mislaid and save time in use. Cut fingers are avoided and handling made easier by the slot-dispensing feature.

FACTORY TO YOU
HARDENED AND GROUNDED
FLOATING HOLDERS



C. R. S. BUSHINGS—DRILL SIZES

.22 in. .28 in. .34 in. .40 in.

HALCO PRODUCTS 14231 BIRWOOD
COMPANY DETROIT, MICH.

Health and Defense

Can American soldiers and industrial workers match the physical stamina in dictator nations?

Might does not make right, but today, right cannot prevail without the defenders of the right becoming mightier than the aggressors.

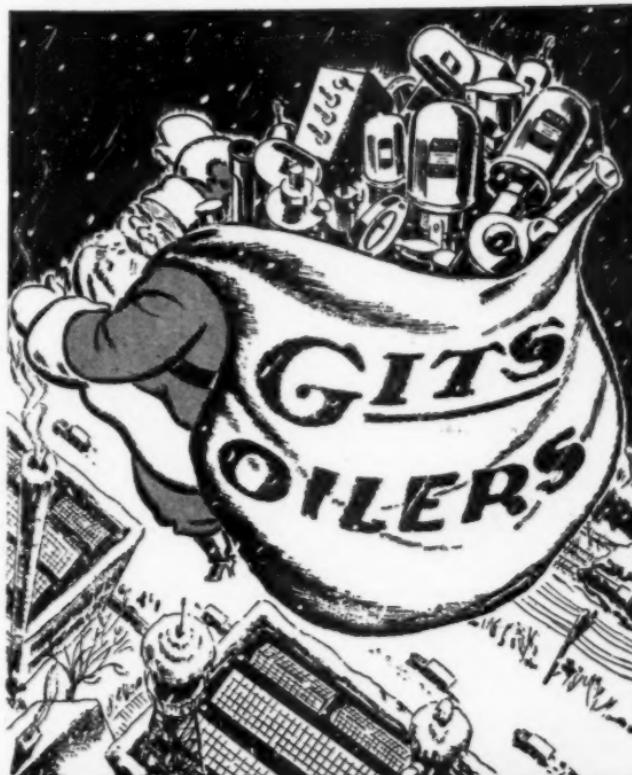
Dr. Victor G. Heiser, Consultant, National Ass'n., Mfrs., emphasizes that one of the secrets of the Nazi military success is physical fitness — not merely the health of pilots and gunners but the health of the whole German people — especially the health of the men and women in the factories.

It takes 17 men behind the line to keep one soldier on the firing line, which shows the importance of the industrial workers' health.

When the Doctor visited Germany some time ago, he noticed that the girls wore dresses of standard pattern, but of different colors.

He learned that the colors of the girls' dresses indicated the quality of their work for the Government. If a girl's work was excellent, she was permitted to wear a brown dress. If her work was only fair, she had to wear a gray dress. If her work was poor, she had to wear a dress of another color.

This is representative of the methods



GITS BROS. MFG. CO.

1860 South Kilbourn Ave.

Chicago, Ill.

30 years of oil cup experience

used to develop competitive spirit. Each girl constantly tried to improve her work so she could wear a brown dress. Similar badges of merit were contrived for all industrial workers.

Workers found to be physically unfit for jobs were taken off until their health could be restored, or they were assigned to less arduous work.

By such methods, the Nazis built an industrial machine capable of maximum production and one that was not vulnerable to breakdown through physical failure of a man-power chain link.

SPECIAL TOOLS AND GAGES DESIGNED and BUILT



DIES—JIGS AND FIXTURES LARGE OR SMALL

COMMERCIAL JIG BORING

We can handle your jig boring work at reasonable prices on our 18"x36" Pratt & Whitney jig borer. Prompt service.

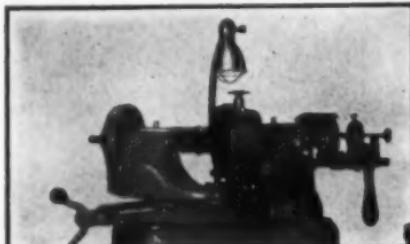
COMPLETE HEAT TREATING EQUIPMENT

Have been delivering satisfaction since 1929.
Let us help you on your tooling problems.

QUALITY TOOL & DIE CO.

RAY W. RICE, Manager

401 N. Noble St., Indianapolis, Ind.



"DOUBLE QUICK" Urges Industry

Dark days and night work together with high efficiency demand require VIMCO-LIGHTING.

VIMCO'S localized, high-intensity spot lighting is adaptable to any use anywhere.

U. S. Electrical Tool Company's precision products use VIMCOLIGHTING. Send us your lighting problem.

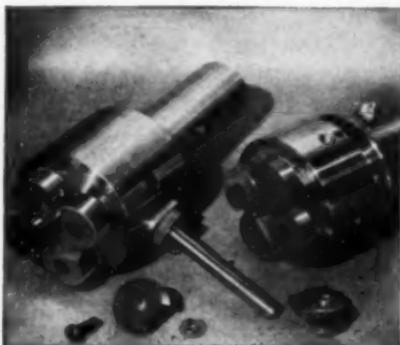
VIMCOLIGHT

VIMCO MANUFACTURING CO.
14 CHEVRON ST. BUFFALO, N.Y.

Threading Performance

Right now, there is wide interest in raising output—in stepping up productivity of machine tools.

Outstanding performances in any line are interesting, providing a basis for comparison.



The illustrations show a standard National Acme "Namco" style DS circular chaser die head—and a set of chasers that have cut many, many miles



of thread. These particular chasers were used by the Union Malleable Mfg. Co., Ashland, Ohio in cutting 1,531,200 threads on $\frac{1}{2}$ " malleable pipe unions. Each sharpening grind removes .015" and it is small wonder that after such performance, this particular set of chasers looks sort of "used up."

Fill In and Mail TODAY

To receive the BLUE BOOK free every month, fill in the names and titles of the officials responsible for the purchase of Machine Tools and Shop Equipment. Thank you.

Name _____

Title _____

Firm Name _____

Street _____

City _____ State _____

Products _____

Number of Men Employed in Your Plant _____

Do you refer to the BLUE BOOK when purchasing
shop equipment? _____

Other Officials who should receive the BLUE BOOK

Name _____

Title _____

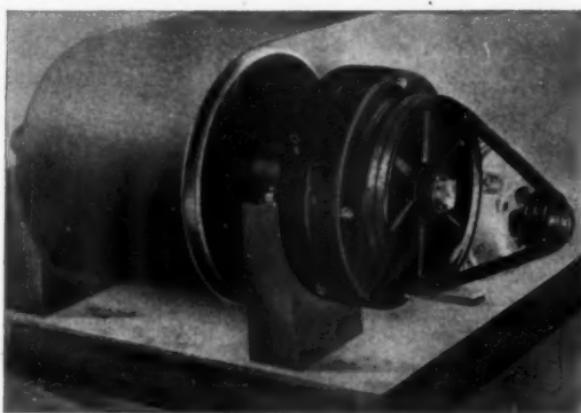
Name _____

Title _____

"American" Reduction Drive—

A new and practical method of speed reduction has been introduced by The American Pulley Company, Philadelphia, which is said to make complete dealer stocks practical, permitting immediate delivery of equipment to produce any desired speed.

It consists of two major elements. A helical-gear reduction unit which mounts directly on the shaft of the driven machine and a standard belt drive between motor and input shaft of the reduction unit. The unit itself has a standard, fixed ratio of 13 to 1, any greater or less ratios being accomplished by the primary belt drive. For example, where an overall reduction ratio of 52:1 is de-



sired, a belt drive is selected with a ratio of 4:1. This ratio, in combination with the ratio of the reduction unit, delivers precisely the speed desired.

STURDIMATIC

HEAVY
DUTY

LIVE CENTERS

ARE

AUTOMATICALLY COMPENSATED FOR

EXPANSION, SHOCK AND WEAR

ARE ACCURATE, DURABLE

WRITE FOR CATALOG AND FREE TRIAL OFFER

STURDIMATIC TOOL COMPANY

5224 THIRD AVE.

DETROIT, MICH.

VICE

For
DRILL
PRESS

With and Without Jig Attachments

6", 9" and 12" Jaws

Often used
on Miller,
Shaper or
Planer.

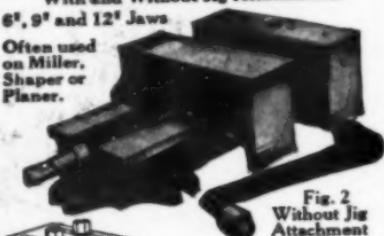


Fig. 2
Without Jig Attachment

Send for Circulars



Fig. 3
V-Jaw Holds
Round Work
Vertically, or
Horizontally.

THE GRAHAM MFG. CO.
78 Willard Ave., PROVIDENCE, R. I.

RECLINABLE POWER PRESSES



We manufacture a complete line of mechanical power presses, with sizes and types for every need in your shop.

*Write for
bulletins.*

ZEH & HAHNEMANN CO.
Newark, N. J.
New Jersey

Five reduction units, each with the same 13:1 ratio, cover all applications from $\frac{1}{2}$ to 30 h.p. Therefore, any desired speed between 11 and 215 r.p.m. can be provided with standard, "stockable" equipment. For speeds lower than 11 r.p.m. special reduction units can be assembled.

Because the unit mounts directly on the shaft, as easily as a conventional pulley, no space or expense for special foundations is required. The shock-absorbing action of the primary belt drive protects the gears from shock loads, prolonging the life of the unit. Necessary maintenance attention is confined to infrequent lubrication. The overall efficiency of the drive, when equipped with a tension-control motor base, is said to approximate closely, the 98½% efficiency of the reduction unit itself.

A New Non-Slip Floor Wax

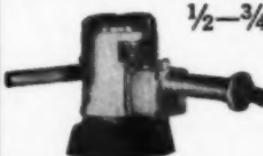
All of us have seen advertisements about duPont's Neoprene. This is a synthetic, much tougher than rubber with accompanying advantages of withstanding more sunlight, more abrasion, greater heat, and will, therefore, provide longer service for many purposes, one of which is in combination with Carnauba Wax.

A new patent has been applied for, to cover a process whereby Neoprene is used in the manufacture of Non-Slip Wax, providing greater lasting qualities, an equal gloss, and less danger of personal injuries from falls.

More information about this new Wax may be obtained by writing to the manufacturer, Flexrock Co., 2305 Manning St., Philadelphia, Pa.

CUTS GRINDING COSTS

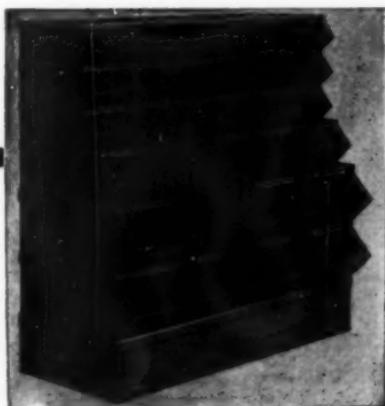
$\frac{1}{2}$ — $\frac{3}{4}$ —and MORE



HEAVY DUTY

3 Phase
60 Cycle
No Brushes

GASTON POWER TOOLS
2655 W. 95th St., Evergreen Pk. III.



AUXILIARY STOCKROOMS

**—Wherever You
Need Them!**

STACKBIN sections will give you a Stockroom wherever you want it—quickly and easily as building a sectional bookcase. These patented sectional storage bins nest together without the use of tools—cost you nothing to build, nothing to move. Find out today how STACKBINS can lower YOUR handling costs.

Write to
STACKBIN CORPORATION,
55 Troy St., Providence, R. I.

STACKBINS

"STACKED AND STILL ACCESSIBLE"

Prepare Your Tool Room FOR GREATER DEMANDS BY INSTALLING OLIVER OF ADRIAN DIE MAKING MACHINES

They will save 50% to 60% of the labor over hand methods;

They will relieve the pressure in your Tool and Die departments;

They will pay their way in actual savings.

Their use permits less skilled help on many operations.

Nine Styles to choose from—

Priced as low as \$125.

SEND FOR FREE LITERATURE.



OLIVER INSTRUMENT CO., 1408 E. Maumee St., Adrian, Michigan

"ALNOR" PYROMETERS

for every requirement.

Inexpensive,
accurate, durable.

Write for catalog.

Illinois
Testing Laboratories, Inc.
150 W. Hubbard St., Chicago



LINCO Two Spindle Adjustable Drill Head

Drills two holes at once, engineered for all types of drill presses and is especially adaptable for small presses such as Canedy Otto, Demco No. 15 and similar. Drill centers 7/8" to 6", speeds up to 3600 R. P. M., capacity drills 5/16" to 1/2". Two sizes, the smaller, with aluminum gear case only 9 1/2 lbs. Roller and ball thrust bearings. With attachment may use for tapping.



LINDERME
Machine & Tool Co.
12253 Coyle Ave.
DETROIT, MICH.

Streamlined Photo-Troller

A new 7-page illustrated booklet (No. 18-312) describing the type RQ Photo-troller and its accessories is announced by Westinghouse. This is a general purpose photo-electric relay for operation on 115 volts indoor service

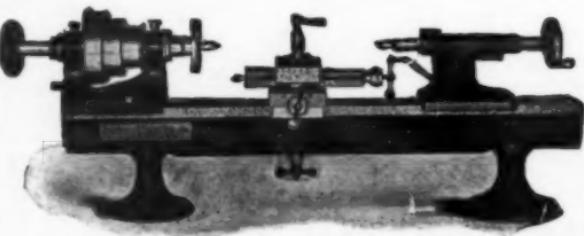
The booklet gives some of the more common applications, with a number of pictures showing the unit applied on different equipment. Distinctive features are pointed out and a complete description of both the light source and the photo-cell unit are included, along with pictures.

Operating distances and application data are given, and handy application charts showing "what unit to use where" make selection of the correct apparatus easy.

Copies may be obtained from department 7-N-20, Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa.

Rawlplug Data Chart

"Dimensional Chart for Expansion Bolts and Screw Anchors" is a helpful wall chart, 15"x20", giving many tables for wood and lag screws, machine bolts and machine screws and the proper size anchor to use in connection with each. It also gives the correct size hole to be drilled in each case. It is very complete and profusely illustrated. A copy will be sent free to any one writing direct to the Rawlplug Co., Inc., 98 Lafayette St., New York City, on their firm's stationery.



WADE Bench Lathes

Economical, accurate, enduring for turning, drilling, threading, grinding, milling and screw machine operations.

Wade Tool Co.
Waltham, Mass.

A Stronger Kennametal

A straight tungsten carbide grade of Kennametal which is claimed to be approximately 15% stronger than other tungsten carbides of the same hardness, is offered by McKenna Metals Co., 135 Lloyd Ave., Latrobe, Pa.

Known as Kennametal grade K4, the new material has a hardness of 92.0 Rockwell A and strength of 223,000 lbs. per sq. in. (tranverse rupture test), as compared to a hardness of 91.8 Rock-



well A and a strength of 190,000 lbs. per sq. in. for a comparable brand. The increased hardness and strength of Kennametal K4 are said to result from improved methods of carbide manufacture developed for the production of the steel cutting grades of Kennametal.

Kennametal K4 has the same thermal conductivity as other tungsten carbide tool materials, namely, 0.19. Due to its high thermal conductivity, together with its unusually high wear-resistance, grade K4 is particularly applicable to the machining of hard, crumbly materials such as cast iron, "transite" pump, Bakelite, porcelain, hard rubber, glass, casein—as well as silicon aluminum, hard bronze and other non-ferrous materials.

The increased strength of K4 is particularly desirable for rough cuts or interrupted cuts on hard metals. The illustration shows a tool tipped with K4 on the stationary post of a turret lathe, set in position for a rough cut across the face of a Pomona jet pump discharge head at the Pomona Pump Co., Pomona, Cal. Note that the cut is interrupted across the six holes on the face, yet the tool took these "jump" cuts without being damaged in any way. The tool on the turret arm is also tipped with K4 and is used to rough and finish the inside diameter of this upper face. According

Champion Expanding Mandrels

$\frac{1}{2}''$ to $6\frac{1}{4}''$
Efficient—Dependable—

Write for catalog

THE WESTERN TOOL
& MFG. CO.

Springfield • Ohio

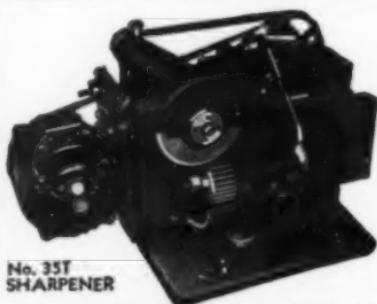
5000
SHAPES AND SIZES
GROBET Swiss Files

Ask for Catalog WF.

The most complete catalog of its kind.
Lists 5000 different shapes, sizes and cuts
of GROBET Precision Swiss Files. Ask also
for catalog WM on files for filing machines.

Learn more about these Chrome Steel Files that have
won a reputation for utmost precision and durability.

GROBET FILE CORP. OF AMERICA 3 Park Pl., New York, N. Y.



No. 35T
SHARPENER

AUTOMATICALLY SHARPENS METAL SAWS IN GANGS

Up to $5\frac{1}{4}$ " diameter and up to $1\frac{3}{4}$ " thickness.
100 SAWS of 26 GAUGE CAN BE SHARPENED
AT ONE TIME.

The saws are automatically indexed and sharpened
within a variation of plus or minus .001 of exact
diameter of entire lot.

WRITE FOR CIRCULAR

The WARDWELL MFG. CO.
3165 FULTON RD. CLEVELAND, O.

MODEL NO. 16 "SPECIAL"

Constructed as per Specifications of
U. S. Naval Aircraft Factories

Reg. U. S.
Pat. Off.



BUTTERFLY FILING and SAWING MACHINE

(Die Making Machines)

This is a very heavy,
powerful machine
and is designed for
extra heavy filing and
sawing, but it
performs small work just
as well. This type of
machine is usually
adopted in Ammunition Plants, Airplane
Factories and machine shops where
heavy and precision filing and sawing is
desired. We also manufacture smaller
models—Model D-10" Table; Model No.
L-12" Table.

HARVEY MANUFACTURING CORP.
161 Grand St., New York
Phone: CAanal 6-5170

to the pump manufacturer, use of Kennametal tools resulted in accurate, close-fitting parts and more heads machined per grind of tool.

Kennametal grade K4 tools and blanks are sold at the same low prices recently put into effect for steel cutting grades of Kennametal. Price list and complete information will be sent free upon request.

G. E. Announces New D-C Motors

Compactness and improved protection are stressed as two outstanding features of a new line of d-c motors recently announced by General Electric Co., Schenectady, N. Y. A new design of rolled-steel frame and improvements in end-shield and bearing-bracket construction combine to give the new motors excellent protection from external damage. The use of Formex wire coils and a specially developed Glyptal insulating varnish provide high resistance to impact, abrasion, and the action of foreign materials. The motors can be furnished with sleeve or ball bearings.

Open motors are available in constant speed ratings from $\frac{1}{2}$ h.p. at 850 r.p.m. up to and including 60 h.p. at 1750 r.p.m. and, in adjustable-speed ratings from $\frac{1}{2}$ h.p. at 850/3400 r.p.m. up to and including 15 h.p. at 500/1800 r.p.m.

Motors in the larger ratings (beginning at 50 h.p., 850 r.p.m.) embody additional design innovations such as a new system of self-ventilation, extra protection of all current-carrying and rotating parts, and large conduit boxes. New V-type double-brushholders give better commutation and permit rotation in either direction and a new type lifting lug facilitates handling.

Other features common to the entire line include lower WR2; small diameter, which means low headroom; reversal without changing any parts of the frame, fan, or brush rigging; and Textolite wedges in the armature slots to protect the windings.

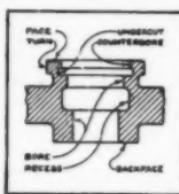
The Precision Universal Tool Head

THE ONLY BORING TOOL THAT IS ADJUSTABLE
WITHOUT STOPPING THE MACHINE.

A truly universal Tool Head that has rendered all types of the once popular wrench-adjusted "offset" or "eccentric" boring tool entirely obsolete, as it brings all adjustments under absolute micrometric control of the operator at all times and at all speeds without stopping tool or machine. By a mere turn of the wrist the cutting tool is instantly adjusted to "tenths" for boring or fed continuously across or into the work for facing or recessing.

It is not only the fastest and most accurate boring tool in existence, but is far more than that as it also faces, counterbores, turns outside diameters of hubs and bosses, recesses, mills flat surfaces and slots, undercutts, back-faces, trepanns and does countless "headache" jobs that wrench-adjusted boring tools cannot do because they cannot be adjusted while running.

Eight operations performed at one setting on hub on awkward two ton casting in 72 minutes. No special tools or set-ups required. Let us solve your difficult problems. Write for Bulletins.



ADJUSTABLE
While Running!

Absolutely Different

THE PRECISION TOOL COMPANY
P. O. BOX 155, BROOKLYN, NEW YORK

Cables: PRETOOL-NEW YORK

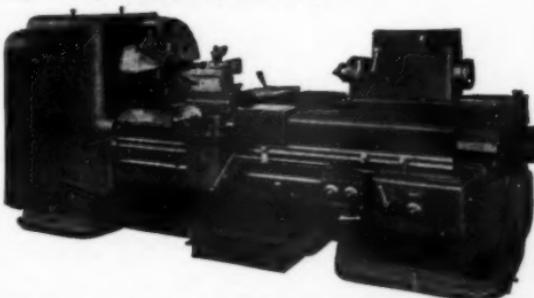
Tel. MAin 4-1064

New Heavy Duty Lathe by Morey

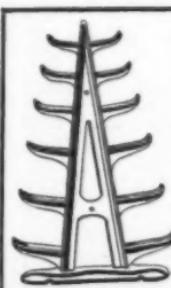
A heavy duty hydraulic lathe is announced by the Morey Machinery Co., Inc., 410 Broome St., New York, N. Y. This new Morey "27," features directional finger tip control, permitting operation by unskilled labor.

The "27" is especially adapted for ordnance work. A special carriage is available designed for turning and boring shells. This carriage is arranged with a complete hydraulic cycle. The front tools are fed into the work, then fed longitudinally until the shell is turned, simultaneously the cutoff tools size the shell to length. Upon completion, all tools are automatically withdrawn and returned to the starting point.

The "27" is also well adapted to other manufacturing uses. Two general purpose headstocks are available and four combination types of carriages can be supplied.



A few of the specifications are:—height from floor to center, 42"; swing over ways, 28"; maximum chuck diameter recommended, 24"; swing over carriage slide, 11"; hole through spindle, 6 1/4". For heavy duty turning the manufacturer recommends a 50 h. p. motor at 1800 r.p.m. For medium duty, roughing, and general turning, a 25 h. p. motor at 1200-1800 r.p.m. An illustrated bulletin is available giving complete specifications.



"CHAMPION" Steel Racks

Save time, steps and money by keeping bar stock, shafting and pipe out of the way and off the floor.

Write for full details.

**The Western
Tool & Mfg. Co.
Springfield, Ohio**

Easier, Speedier Screw Driving

Independent Pneumatic Tool Co., 612 W. Jackson Blvd., Chicago, Ill., announce a new method of handling screws on assembly operations, in-



-GEARS-

Spur—Helical—Worm— Bevel—Miter, Etc.

We do broaching and all kinds of grinding.

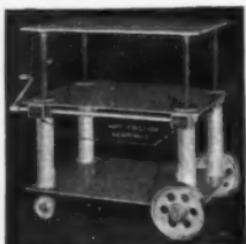
We specialize in grinding hardened steel bushings, cam rollers, etc.

Prompt service and quality has retained a large list of customers for 25 years.

TAYLOR MACHINE CO.
1919 E. 61st St., Cleveland, Ohio

creasing, it is claimed, by 3 to 9 times in many instances, the already established efficiency of power driving of screws.

A new device, known as the Thor "Pix-Up" Finder and Adjusto-Tray, sorts, picks up and holds all sizes and types of screws for driving. It eliminates the time-wasting hand operations of picking up screws by the fin-



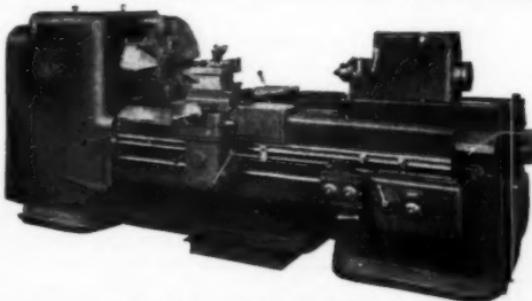
The HAMILTON PORTABLE ELEVATING TABLE—"PORTELVATOR"

No strained backs or bruised fingers if you let the Hamilton "Portelvator" do the lifting for you. Use it as means of support—Use it to level large overhanging pieces of work—Use it as a bench to work on—An economical and efficient helper—One to twenty ton hand or power operated.

Write for full details today.

THE HAMILTON TOOL COMPANY
B AND WAYNE STS., HAMILTON, OHIO

MOREY 27" Manufacturing Lathe



These lathes fill an important place in the Defense Program in the turning of shells. They are built for single purpose operations.

Automatic Roughing Lathe

A special carriage carrying a front multiple tool holder and 2 adjustable cut-off tool holders in the

rear, arranged with a complete hydraulic cycle is recommended. The front tools are fed into the work, then longitudinally until the shell is turned. Simultaneously the cut-off tools cut the shell to length. Upon completion, all tools are automatically withdrawn and returned to starting point.

**Efficient, accurate and simple in operation.
Designed for handling by non-skilled labor.**

Let us send you complete details.

MOREY MACHINERY CO., INC.

410 BROOME ST.,

NEW YORK, N. Y.

CHATTERLESS COUNTERSINKS



We also offer a complete line of Midget Milling Cutters, ground by hand from the solid after hardening. They do a faster, cleaner job than rotary files, last longer and can be reground repeatedly. Unlimited forms, shapes, helix angles, etc., are readily obtainable. Write for full details.

Severance countersinks are designed to take heavy cuts and at the same time produce an amazingly smooth seat. The Cutting teeth are so arranged as to give a shearing cut and make chatter almost impossible. Special countersinks made in various combinations of angles, diameters, lengths, ball nose, double angle, and shank types and sizes.

Submit your problems with full particulars to our engineers or write for Bulletin No. 12-E

Severance Tool Manufacturing Co.

1510 East Genesee Ave.

Saginaw, Mich.



Tapping As Fast As You Can Drill..

with the A. M. Sensitive Tapping Machine . . . from the smallest and finest up to $\frac{3}{16}$ " diameter in steel and iron—and up to $\frac{1}{4}$ " in softer materials. A modern unit

that within its capacity, will take all the punishment intense production can inflict.



*Write TODAY for
this sure solution of
your small
tapping
problems.*

**A- MUEHLMATT DIVISION
OF
THE HAMILTON TOOL CO.**
B and Wayne Sts.,
HAMILTON, OHIO

TAKE THE DUST OUT OF INDUSTRY

*Save Time, Labor and
Maintenance Expense*

with the

TORNADO
Portable Industrial
Vacuum Cleaner

Powerful—
 $46\frac{1}{4}$ " waterlift

Portable—
Wright 40 lbs.

Capacity—
12 gallons

Sturdy—
Built to last

Attachments for
every purpose

FREE TRIAL
Write to



BREUER ELECTRIC MFG. CO.
5118 N. Ravenswood Ave., Chicago, Ill.

gers and starting, or holding the screw in tapped or drilled hole. Not magnetic, but entirely mechanical, the unit is extremely simple.

It consists of the Adjusto-Tray, which is spring mounted on a base and adjustable by clamps screws at each of four corners for the particular length of screw to be driven. The tray is of sheet steel with flanged sides and ends and has a series of longitudinal slots. Into this tray a quantity of screws is spilled. Shaking the tray a few times suspends the screws in the slots by their heads.

A power screw driver equipped with the "Pix-Up" Finder is then placed over a screw head, pressed and, as the tray depresses slightly, the finder grips the screw head firmly in alignment, holding it ready for the driving operation.

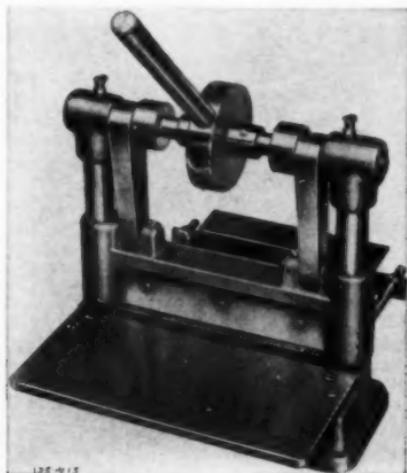
The finder itself, is an extension type that is fitted to any Thor power screw driver. It has three slots lengthwise which open slightly as the finder is pressed over the screw head and close on the head to hold the screw, acting as mechanical "fingers." Inside the lower end, the finder is recessed to fit the particular size and type of screw to be driven.

Over the finder is screwed a sleeve, the inside diameter of which is only slightly larger than the outside diameter of the lower end of the finder proper. This prevents the finder from spreading any farther than necessary for entrance of the screw head into its recess. Thus, undue springing is prevented and early fatigue failure forestalled. To compensate for gradual loss of spring action and for wearing of the recess, the "Pix-Up" Finder is provided with external spiral grooves which accommodate a spring tension ring. This ring permits a long range of gradual adjustments of the finder tension.

Bulletin JE-63 gives complete details.

Micro Bench Brake and Bench Shear

Three bench tools for speedy and economical production of small lots of small parts are offered by O'Neil-Irwin Mfg. Co., 314 8th Ave., Minneapolis, Minn. These were originally developed for use in their own plant, to reduce the cost of blanking or forming dies on small lot jobs. The tools proved so successful that they are now offered to the trade.



125-4115

The brake is described as a precision die substitute machine for metal duplicating and creating angle and channel materials from sheet and strip stock. Angle and channel materials may be formed in sizes from $\frac{1}{8}$ " upwards. Angles, brackets, V's, etc., can be formed, as well as other types of folding to 110° of radii. It covers the range of folding work between the floor type brake and light work customarily performed with a vise or pliers. Operations are completely visible, allowing full inspection and control.

Complete horizontal and vertical adjustment of the folding plate are provided, for accurate setting to obtain acute or obtuse angles of natural radii over the entire capacity range of the

HAMMOND
of KALAMAZOO

GRINDERS

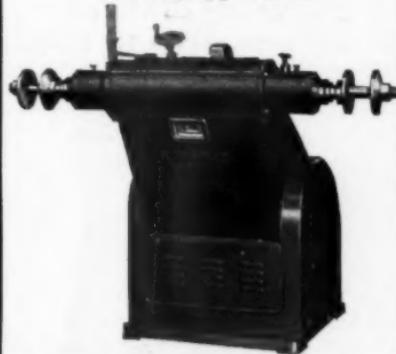
Tool Production and Disc
 $\frac{1}{4}$ H. P. to 20 H. P.

TOTALLY ENCLOSED
FAN COOLED
MOTORS



POLISHERS

1 H. P. to 50 H. P.—A model for every application



A MODERN, UP-TO-DATE LINE of Quality Grinders and Polishers.

- Pin our signature to your letter-head for complete literature.

Hammond Machinery Builders
INCORPORATED
KALAMAZOO, MICHIGAN U.S.A.

1614 DOUGLAS AVE.



**WE'VE INCREASED OUR PLANT
BY 4 TIMES SINCE 1935—
BECAUSE AMERICAN INDUSTRY
IS CUTTING COSTS WITH
UNIVERSAL DRILL BUSHINGS**

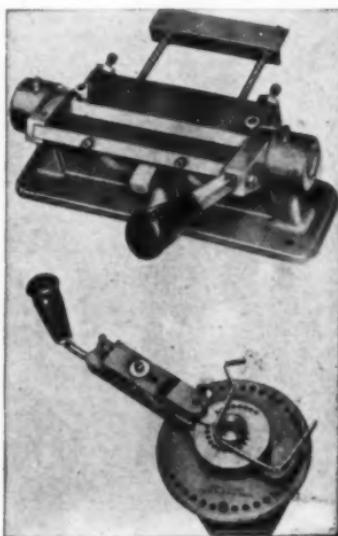
American Industry is more and more specifying Universal drill bushings because: (1) they have superfinished bores, straight and round within .0001; (2) unexcelled wearing qualities; (3) rust-proof black domes; and (4) nickel-steel, cadmium plated lock screws. Available in all ASA standard sizes. Write for facts.



UNIVERSAL
Engineering Company
Frankenmuth, Mich.

machine. Accurate folding stops are provided for duplicating operations to a tolerance of .001". Material guides are quickly adjustable. Maximum folding width is 6". Maximum folding capacity is full width, 18 gauge steel plate. Maximum folding capacity, 4" width is 16 gauge steel plate. Net weight is 25 lbs.

The shear is shown in the upper half of illustration. The bender is included below.



The shear fills the gap between the heavy floor type foot operated shear and the manually-operated tinsmiths' shears. It can be set for accurate trimming of metal stampings for die duplicating work, and for shearing material to die duplicating size from stock sheets. The hand lever provides sensitive cutting control.

Working table can be drilled and tapped for precision gauges for die substitute and semi-production work. Made of steel plate, it can be replaced from stock material. Adjustable material guides are provided for accurate shearing to a tolerance of .001".

The design allows circular and irregular pieces to be sheared, where only part of the piece is to be trimmed.

Interfering material may be left free of the blade by shearing from around the ends of the shear. Adjustments are provided for clearance between shearing blades, varying from close tolerances without buckling or knurling on ordinary material to hairline shearing of light materials.

Maximum shearing width is 6 $\frac{1}{4}$ ". Maximum shearing capacity full width, is 24 gauge steel plate. Maximum capacity, 1" width is 18 gauge steel plate, with heavier gauges of other materials in proportion. Net weight is 25 lbs.

The bender is termed a basic bending machine and will duplicate many varieties of metal pieces and substitute for blanking and forming dies, within its capacity. The hexagon shape of heavy base allows six convenient positions for vise mounting. The automatic nose automatically opens for rapid receiving and delivering of material for semi-production work. Material can be cut to exact length before forming. Net weight is 14 lbs.

"Controlled Abrasives"

"Controlled Abrasives" is something that is claimed by the National Metal Abrasive Co., 3560 Norton Road, Cleveland, Ohio, to be a revolutionizing step in the manufacture of steel shot and grit. By this new process, what formerly was just standard shot and grit has now been so controlled that each size is given the correct processing to produce the most effective degree of toughness and hardness in relation to size.

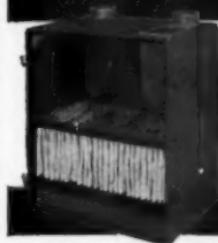
It is claimed that with the degrees of hardness—toughness controlled that entirely different results are obtainable. In fact, the shot and grit can now be bought to give the most advantageous results, just the same as it is possible to obtain steel for specific uses.

This, combined with size, allows a customer to place his abrasive cleaning, hardening or finishing on a real economical known basis, in keeping with his other operations.

The National Metal Abrasive Co., it is said, has been working on this for years in their Research Division and are now in a position to offer something different in Abrasives.

TORIT

Dust Collectors



**REMOVE DUST-
LADEN AIR
from POLISHING
and
GRINDING WHEELS**

Model No. 52 with the door of the steel cabinet removed, showing the motor, fan-housing and spark-resistant filter bags.

**THE SAFEGUARD PROVIDED BY
TORIT DUST COLLECTORS—TO VAL-
UABLE EQUIPMENT, AND TO WORK-
ERS' HEALTH, THEREBY INCREASING
THEIR EFFICIENCY—is PROTECTION
YOU CAN'T AFFORD TO BE WITHOUT.**

Available in several sizes, ready to be piped to pedestal grinders, surface grinders, bench motors, buffers, cut-off machines, etc., they gather dust and grindings and return the air absolutely clean. Since the air is re-circulated, there is **NO HEAT LOSS!** The rear view sketch at the right shows a TORIT Dust collector connected to both wheels of a grinder—typical of many types of possible installations.



The satisfaction derived from them by hundreds of users is your assurance that a TORIT Dust Collector will serve your requirements efficiently. INVESTIGATE THIS EQUIPMENT RIGHT AWAY.

Write for our new bulletin today.

Torit Manufacturing Co.

303 WALNUT ST. ST. PAUL MINN.

ARMGLO

Manufacturers of Resistance Welders—Foot, Motor, Air and Hydraulic operated.

•
Standard and for specific applications with and without electric timing control.

•
Bench type filing and sawing machines and abrasive band finishing machines.

•
ARMGLO COMPANY
Milwaukee, Wisconsin



3 NEW CIRCULAR TABLES

10 inch, 12 inch, and 15 inch diameter; substantially constructed to provide years of high precision service. Write for Gorton Accessories Catalog and learn more about these extra-value tables.

GEORGE GORTON MACHINE CO.
1115 13TH STREET
Racine Wisconsin

A Furnace Atmosphere—For Carbon Steels

How the control of carbon-content in a newly-developed gas mixture protects the outside of steel while it is being hardened was explained at the recent National Metals Congress by J. R. Gier, Westinghouse research engineer.

The mixture, called "Endogas" atmosphere, acts as a blanket for steel products such as gears, springs, bearings and metal-cutting tools and prevents decarburization during the hardening process. This development provides a cheap atmosphere that will prevent burning, scaling and softening of steel surfaces under heat treatments at temperatures as high as 1500° to 2300° F. By varying the amount of carbon in the mixture, the carbon content of the "Endogas" can be adjusted to balance the carbon content of any steel.

The greatest problem during high temperature heat treatment of carbon steel is to prevent escape of carbon from the surface layers to join with other gases, particularly oxygen, that may be present in the hardening furnace. This is prevented by providing a furnace atmosphere that also contains carbon—just enough of it to balance exactly the carbon in the steel.

"Endogas" is made by mixing air with natural gas or other inexpensive fuel gas, and heating the mixture in an electrically heated chamber. By regulating the amount of gas and air entering the chamber, the proper amount of carbon can be sent along to the furnace to balance the amount of carbon in any grade of steel.

ALL ALLOY PORTABLE SHEARS
FULLY GUARANTEED

Two Sizes

No. 1 cuts up to No. 11 gauge strip or sheet.
No. 2 cuts up to $\frac{3}{8}$ inch steel plate.

Special Blades for shearing stainless steel.

BREMIL MFG. CO.
1720 Pittsburgh Ave., Erie, Pa.

Heavy Duty Carbide Tool Grinder

Thomas Prosser & Son, 120 Wall St., New York, announce a Heavy Duty Carbide Tool Grinder—big brother of their Model "AA" machine. The new grinder embodies the attractive features of the smaller machine, plus ample power for grinding the heaviest tools, together with the very important provision for wet grinding.



The makers emphasize that the machine provides for rapid removal of metal when roughing, along with precision finishing of all single point tools to smooth, keen cutting edges, with flat surfaces held exactly to desired angles. Absence of vibration adapts it for the use of diamond wheels. At the same time, it has ample power and stamina to permit the use of the coarsest roughing wheels. High speed steel and stellite, as well as carbide tools can be ground quickly and economically.

A feature seldom found on moderately priced grinders suitable for the average shop, is the wet grinding equipment, providing a copious flow of

I Hear You Distinctly
in this
Acousti-Booth



Patented

● It is so easy to hear, even in the noisiest shop, when your factory telephone is used in a Burgess Acousti-Booth. The acoustic lining soaks up noise and creates a remarkable "zone of quiet" within the booth. You can always hear distinctly no matter how close you are to noisy machinery.

Hundreds of these *doorless* booths are in daily use from coast to coast. We shall be glad to send you an illustrated catalog showing various Burgess models and names of satisfied users. Just mail the coupon.

Mail Coupon for Free Booklet

Burgess Battery Company, Acoustic Division
Dept. HM, 500 W. Huron St., Chicago
Please send Free booklet describing Burgess
Doorless Acousti-Booth and how it makes tele-
phoning easy in noisy places.

Name _____

Firm Name _____

Street-City _____

BURGESS ACOUSTI-BOOTH
Manufactured under Burgess Patents

CARROLL
Universal Dividing Heads



22 Years of Popularity. 6°, 10½°, 12° Swing, Right or Left Hand Type.

Rigid, Accurate, Long-Life.

WM. CARROLL & SON
 1776 Lexington Ave., (Norwood) Cincinnati, Ohio

water, keeping the tools cool, and permitting much faster grinding of all types of carbide tools, without danger of cracking or checking, also saving wheel wear. The equipment comprises a coolant pump, pan, and settling tank, with all brass piping, valves, and nozzles. Nozzles are arranged so the flow of water can be directed on the tool, regardless of which side of either wheel is being used.

Quick-acting indexing tables permit instant and accurate setting to the required angle. It is unnecessary to raise or lower table as its edge always remains at the same point with respect to face of wheel.

A high grade spindle is furnished, running in double-row, self-aligning, precision ball bearings, with labyrinth dust seal, driven by double "V" belts.

Either diamond or silicon carbide cup wheels may be used on either end, so any combination of wheels desired may be employed. The cup wheels are mounted on steel backing plates, and their location on shaft is adjustable to compensate for wheel wear. Face of wheel can be kept close to table and wheels used up practically 100%.

A totally enclosed dust-proof motor of standard manufacture is supplied, with a drum type on - off - reverse switch, so that roughing and finishing of both right and left-hand tools can be done conveniently, with wheels always rotating towards cutting edge of tools.

Standard Since 1911



L & J

INCLINABLE POWER PRESSES

L & J PRESS CORP.
 Successors to Lashbrook-Jordan Tool & Machine Co.
 1635 STERLING AVE. ELKHART, INDIANA



Here's how to get real value from your grinding wheels. Dress and true them regularly. Use Vincent Improved Huntingdon dressers equipped with Vincent **high-carbon tool steel cutters**. Your mill supply distributor can supply them, and they cost no more than the ordinary kind.

Insist on the dresser with the aluminum finish.

Write for descriptive catalog sheets.

THE VINCENT STEEL PROCESS CO.

2434 BELLEVUE AVENUE

DETROIT, MICHIGAN

"Hobbing Data"

An interesting new publication called "Hobbing Data" is announced by Barber-Colman Co., Rockford, Ill. Copies are available on request for superintendents, foremen, production engineers, master mechanics, and others engaged in the selection and use of hobbing and sharpening equipment.

The book is a comprehensive review of the complete hobbing service offered by this company. The first 32 pages comprise a condensed catalog of all the B-C machines and small tool items, with brief descriptions and specifications of Hobbing machines, Hob Sharpening machines, Hobs, Milling Cutters, and



Reamers. The small tools are covered only in a general way, as complete information is contained in the regular

**JUST ENTERING
OUR THIRTY SIXTH YEAR**



**HIGH QUALITY
EQUIPMENT
ONLY**

FLEXIBLE SHAFTS AND MACHINES VERTICAL AND HORIZONTAL TYPES

1/8 TO 3 H. P.

GROUND ROTARY CUTTERS

**"ATTENTION PLEASE!"
FLEXIBLE SHAFTS
AND
MACHINES
ARE NOT A "SIDE LINE"
WITH US**

WE ARE 100% MANUFACTURERS
SEND FOR OUR NEW 80 PAGE CATALOG
GIVE NAME OF YOUR FIRM AND YOUR TITLE

**N. A. STRAND & CO.
5001 WOLCOTT AVE., CHICAGO**



M6C



Abart GEARS



Gears that are accurate, mesh perfectly, run smoothly without clatter or grind, go a long way toward establishing a reputation for your machines. You'll get the best of *Abart*. Gears of any material—all types and sizes. No stocks, made to order only. Send B/P or specifications for estimate.

Speed Reducers—Many types and sizes in stock for immediate delivery. Ask for free catalog.

Abart GEAR AND MACHINE CO.
MANUFACTURERS OF
Speed Reducers & Gears
4012 WEST 107th CHICAGO ILLINOIS

REDUCES DIAMOND INVENTORY

CARBOLOY
DIAMOND DRESSERS
For Dressing All Grinding Wheels

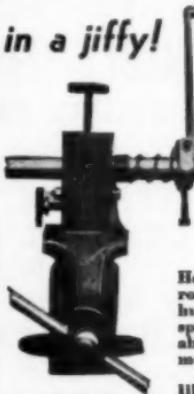
Write for Catalog DR-38
CARBOLOY COMPANY, INC.
11139 E. 8 Mile Road, Detroit, Mich.
Cinc.-Clev.-Newark-Phila.-Pitts.-Worcester, Mass.

small tool catalog "K." On the machine tools, sufficient information is given to determine the adaptability of each of the machines to any specific conditions.

The initial edition carries the first six of a projected series of informative and useful data sheets. Each of these tells the complete story on a specific production hobbing operation, giving all the pertinent data as well as pictures of the operation, the finished gear or spline shaft, and the complete product of which it is a part. In each case, authentic and confirmed production data was gathered on the spot from the shop, to comprise an accurate report of actual production conditions. This data will be valuable to production men as it will enable them to compare results with what they are themselves achieving. Examples have been selected with an eye to excellence, with a view toward helping generally to improve all hobbing practice and to suggest the benefits that may be derived from new hobbing equipment.

MAKE SPRINGS in a jiffy!

with
Blaner
Universal
Hand
SPRING
WINDER



Patent No.
2052443

Write for your
Circular.

Here's a profitable tool room unit. Quickly makes hundreds of sizes of springs. Sturdy, dependable . . . a real time and money-saver.

Illustrated is No. 4 Universal with adjusting shaft of $\frac{5}{8}$ " square. Takes wire up to $\frac{1}{4}$ " diam.

THE JOHN BLANER CO.
Corner Meek & Elm, Sharon, Pa.

INSIST ON THE GENUINE

Abrasives
RED BAND
**DIAMOND
TOOLS**

Look for the **RED BAND**
of Proved Performance!

Write for newest price list and literature.

ABRASIVE DRESSING TOOL CO.
1550 BROADWAY DETROIT

SHELDON

Back Geared Screw Cutting
PRECISION LATHES



A
COMPLETE
LINE OF

moderate priced

10", 11" and 12"

Precision Lathes . . . full size, full weight, built to industrial standards with large ground steel spindles, bronze bearings and hand scraped ways.

Write for Catalog.



MAKE YOUR DRILLING JOBS EASIER

Increase Profits . . . Speed-up Production
End Worker Fatigue . . . Increase Efficiency

by using this

DRILLMASTER RADIAL DRILL

Economical in operating and first cost, this floor type, heavy duty, precision-made, well-balanced Radial offers many features that merit your careful consideration. Drilling to the center of a 36" circle, No. 2 Morse Taper and heavy duty $\frac{1}{2}$ HP ball bearing motor. The full floating, ball bearing spindle assures free and sensitive operation at all speeds.

Send TODAY for bulletin giving full details.

Wm. C. Johnson & Sons Machinery Company
St. Louis, Missouri

**Send for DETAILED
SPECIFICATIONS OF THIS
NEW HIGH SPEED VERTICAL
PROFILER and MILLING MACHINE**



Many new and exclusive features are incorporated in this machine—designed for economical manufacture of small parts requiring accurate interchangeability.

Modern in every detail, fast, convenient.

*Investigate today
by writing for
Bulletin 12M.*

Morey Machinery Co., Inc.
410 Broome Street, New York, N. Y.

Clean,
SHARPLY DEFINED
Scribed Lines
SECURED QUICKLY, EASILY
AND ECONOMICALLY WITH

Micicro
Supreme
LAY-OUT DYE

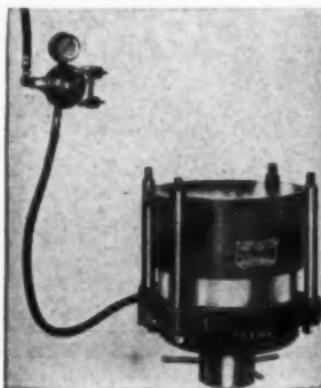
TRIAL OFFER: A handy five-ounce Combination Brush-In-Can...ideal for shop use and for trial purposes...for only

60¢

**MICHIGAN CHROME
& CHEMICAL COMPANY**
6346 E. Jefferson Ave., Detroit, Mich.

Model "D" Die Cushion

The Dayton Rogers Mfg. Co., of 2830 S. 13th Ave., Minneapolis, Minn., announces their new Model "D" improved Universal Pneumatic Die Cushions. These are now made in seven sizes, from 6" to 14", have drawing capacities for deep drawing work from 2" to 8", and can be used with or without surge tank reservoirs.



Each cushion is supplied with a combination reducing regulating control valve and pressure gauge. They may be mounted directly to the bottom side of the bolster plate, for all draw ring and pressure pad control operations, or may be spaced away from the bolster plate, to any desired distance to allow blanks or slugs to pass through punch press bolster plate.

The correct height of the pin pressure pad is predetermined and maintained by the hand-wheel, adjustable feature, compensating for bolster plate thickness variation, sharpening and grinding of dies, and the change of die design.

The cylinder and piston is inverted on the section which serves as a pin pressure pad, making it possible to drop the pin pressure area to the maximum of the drawing stroke by releasing the air pressure and shutting off the supply so the pin plate stands out of the way for blanking and piercing operations, when not needed.

ERRINGTON MECHANICAL LABORATORY

MAIN OFFICE AND WORKS: STATEN ISLAND, NEW YORK

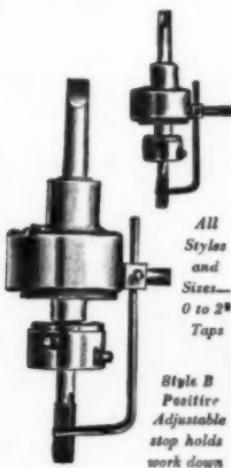
Chicago Office:
6422 N. RICHMOND STREET

New York Office:
200 BROADWAY

Boston Office:
830 OLD SOUTH BLDG.

CLUTCH OR CONE DRIVE

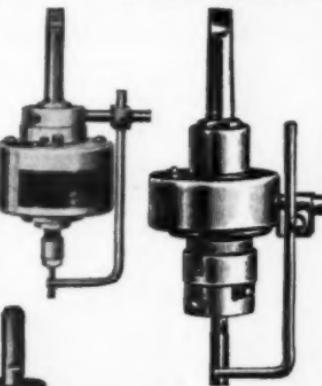
*Our High Speed Tappers
are Super-Sensitive for
Small Tapping*



All Styles and Sizes—
0 to 2" Taps
Style B Positive Adjustable stop holds work down



Style D-E, Quick Change Tools



Style C Graduated Adjustable Safety Friction



*Small Things to do
that will Help you
Avoid Headaches*

**Order that Next Lot of Jig Bushings from ACME
Because—**

You can choose from a complete stock of both A. S. A. and Acme Standards.

They are easy to select from our catalog.

They arrive promptly and thus avoid delays in your shop.

Catalog on request.

ACME INDUSTRIAL COMPANY

210 N. Laflin St.,

Chicago, Ill.

MONroe 4122



TRICO OILERS

SAVE TIME—OIL—WORRY



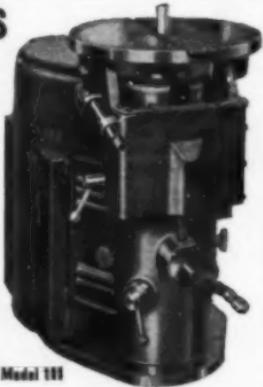
No guesswork—bearing failures—waste—idle machine time—oil-soaked motor windings—fire and accident hazards, when you use TRICO OILERS. There's a type for every application.

WRITE FOR BULLETINS.

TRICO FUSE MFG. CO. Milwaukee, Wisconsin

PETERS

V
O
E
S
C
R
I
N
D
E
R



Model 111

The modern method of grinding and stoning tools and dies, permitting greater accuracy, quick job changes, perfection of finished parts and rapid production—with savings up to 80% in manufacturing costs. Write TODAY for bulletins giving full information.

PETERS TOOL CO., INC.

114 E. Scott St., Milwaukee, Wis.

"Friction-Fighter" Bearings

Realizing the difficulties encountered in trying to distinguish between the series numbers assigned to the various types of anti-friction bearing units,



Link-Belt Co., Indianapolis, Ind., is harmonizing the presentation of its five types by comparing them with prize fighters and re-classifying the group according to the various weights of fighters known to the ring.

The five different types are:—Series 100 ball bearings, and Series 400, 500, 600, and 7200 self-aligning roller bearings

The new classifications are:—Flyweight for the series 100; Welterweight, series 400; Middleweight, series 500; Heavyweight, Series 600; and Alternate Heavyweight, Series 7200.

Helpful engineering and descriptive matter are given in a new 88 page Data Book No. 1775.

OPEN THE WAY TO GREATER PROFITS



BY USING S & S HINGES



BUTTS AND CONTINUOUS LENGTHS — for GUARDS — CABINETS — CASES — BOXES — LUGGAGE

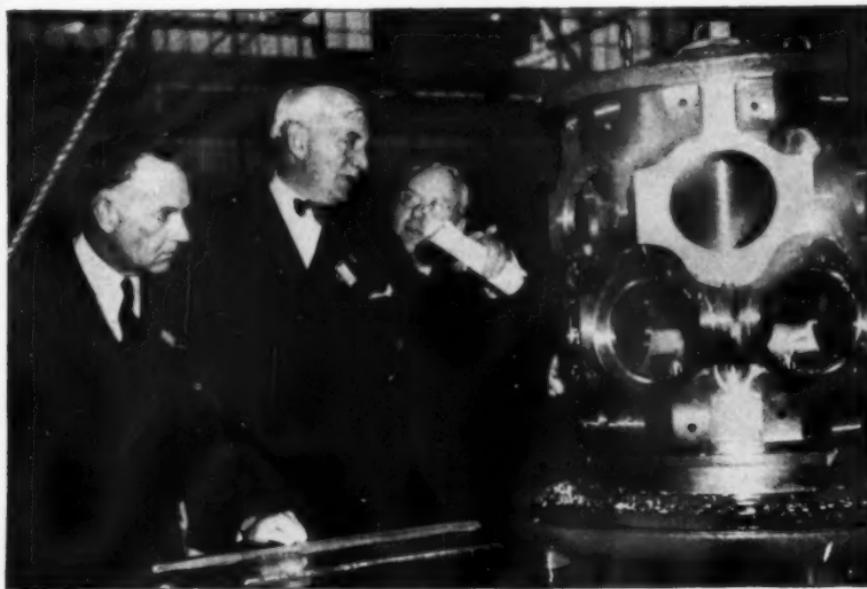
WRITE FOR CIRCULAR

S & S MACHINE WORKS

HARDWARE DIVISION

4530 WEST LAKE STREET

CHICAGO, ILLINOIS



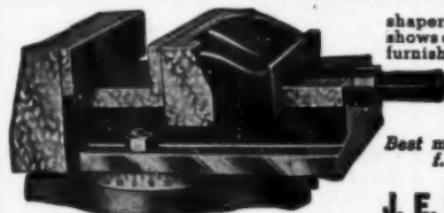
Rear Admiral J. H. Towers, William Knudsen, and Bill Brown inspecting a forged steel motor frame machined with Kennametal tools at Wright Aeronautical Corp., Paterson, N. J. The tools were supplied by McKenna Metals Co., Latrobe, Pa., who also supply Kennametal tools for turning Nitralloy cylinder bars, as well as for other steel cutting jobs at the Paterson plant.

Low Cost Photoelectric Relay

A new photoelectric relay, attractively housed in a cast alloy chassis with a compact molded cover, is announced by General Electric Co., Schenectady, N. Y. It will operate at speeds up to 150 interruptions per minute and at a minimum of 40 foot-candles at the phototube with not more than 15 foot-candles of extraneous light present. Applications include counting, sorting,

weighing, measuring, controlling signaling, inspecting and regulating when conditions permit. The relay has a controlled contact rating of 10 amperes at 115 volts a-c, with two normally open and two normally closed contacts. Coil of the relay is energized when light at phototube is reduced below 30 foot-candles. There are several alternative methods of mounting.

PLUNKET IMPROVED VISES



We make a complete line of modern vises for drill presses, shapers, milling machines and grinders. Illustration shows our standard milling machine vise as regularly furnished and stocked.

In ordering this vise give size of slot in table:

No. 1—5" jaws, 1½" deep, opens 5" wt. 45 lbs. \$34.20
No. 2—10" jaws, 2½" deep, opens 8½" wt. 120 lbs. \$68.00

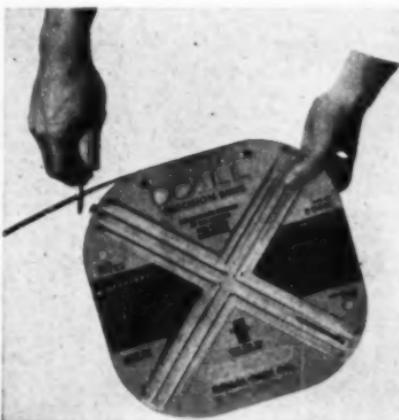
Best material and workmanship. Prices are net f. o. b. Chicago. Dealers' inquiries are solicited. Write for folder TODAY.

J. E. Plunket Machine Co., 1823 W. LAKE ST., CHICAGO, ILL.

Packaging Do All Saws

This improved container for saw bands is a metal box, more rigid and durable than the cardboard box originally developed for packaging narrow band saws. It is designed so that by holding it in one hand, the saw can be pulled out with the other hand in the same manner as a tape measure. When the desired length is pulled out, it is snipped off, ready to weld into

a band. Each box contains 100 feet of saw, and there is a "window" which shows how many feet of saw remains in the box. These boxes may be stacked



CROMARK
TRADEMARK

NAME-PLATE
STAMPING
MACHINE

Write for latest catalog.

H. O. BATES
29 North Broad St.
Elizabeth, N. J.

STYLE
No. 1
\$95.00
F.O.B.
ELIZ. N. J.

DIES
CAN BE
REPLACED.

GUARANTEED FOR 5 YEARS

When you purchase a STEEGE Drive for your lathe, shaper, miller, etc., you're protected by our broad 5-year guarantee.

STEEGE Drives are easily installed—prices \$35.00 up—sent on 30 days' approval. Let us send catalog.

W. L. STEEGE MACHINERY CO.
(Our 23rd Year)
548 W. Monroe St., Chicago, Ill.

on a shelf like books, and there is a label on the outside edge with complete specifications. The labels are in three colors to identify the three different sets: — raker, wave and straight.

Enclosing the coil in a durable box prevents cutting the hands or tangling the coil, and it keeps the saw from being damaged. The lithographed metal box has ribbed embossing on both sides. It stands hard service for shipment and shop use. It was developed by DoAll Saws, 1201 Thacker St., Des Plaines, Ill.

HOTEL ESSEX



Guaranteed comfort—and we mean it. Latest colored tile combination tub and showers—newly furnished and decorated throughout—You'll like it.

\$1.75
SINGLE
Ellis at Larkin

\$2.50
DOUBLE
San Francisco, Calif.

Leslie Hand Punch Press

The Leslie Welding Co., 2945 Carroll Ave., Chicago, Ill., announces a hand operated punch press without ram, ways or slides. Yet it is claimed to have the accuracy of a leader pin die set. It is especially adapted to blanking or punching small stampings or punching along the edges of large sheets.

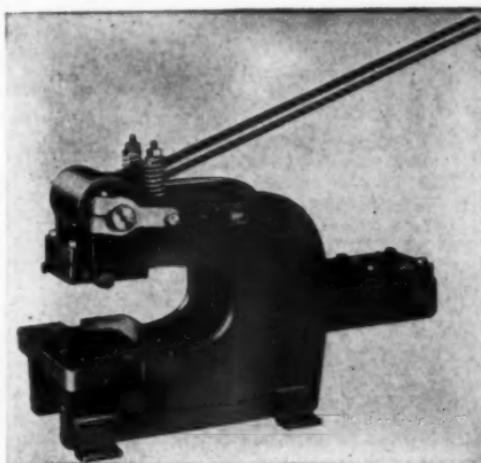
An unusual means is employed for maintaining alignment or registration of punches and dies. This is in the form of a leaf arm that is rigid except at its flexing point. Because of the rigidity of the leaf arm, except at its flexing point and also because of the wide bearing of the operating eccentric, it is claimed that, with this press, it is unnecessary to center the load on the punch plate.

Designed to accommodate most blanking punches ordinarily used on small power presses, the punch plate is 4" x 4½". The clearance from punch plate center to frame is 6". Stroke is 7/16" and stroke adjustment 1/8". Capacity is 2" diameter hole through 14 gauge mild steel or 16 ga. 18-8 stainless steel.

Low initial cost permits the use of a series of these presses for progressive operations.

Ahlberg Bearing Catalog

A new catalog, No. 440, presents 100 pages of interesting and helpful bearing information. In a pictorial trip through the Ahlberg factory the many interesting precision manufacturing operations are shown. There are many illustrations of the different series and types of bearings, tables, engineering data, specifications, etc. A number of pillow block installations are shown. In the engineering supplement, formulae are given for calculating bearing loads, life of bearings, factors of safety, thrust capacities, radial and thrust loads, fits and tolerances, metric con-



version tables, etc. Address Ahlberg Bearing Co., 3025 W. 47th St., Chicago, Ill., for a copy.

BECAUSE KENNAMETAL is STRONGER

• Tools tipped with this superior carbide show greater resistance to breakage:

- When used for interrupted cutting, such as in shaping or planing operations.
- When used for heavy, rough cuts at increased feeds.
- When ground with chip breakers for curling steel chips.

In addition, the greater strength of KENNAMETAL permits tools to be designed with more efficient rake and clearance angles.

KENNAMETAL costs no more than ordinary carbide tool materials—write for our new Price List No. 5.

M-KENNA METALS CO.
135 LLOYD AVENUE
TARENTO, PENNSYLVANIA, U.S.A.

TROYKE ROTARY TABLES



Moderately
Priced

Made in 9", 12", 15", 18", 21", 25".

With or without dividing plates.

Ask your dealer or write us for complete catalog.

ALFRED A. TROYKE
4422 Appleton St., Oakley, Cinc., Ohio

DANLY KWIK-KLAMPS

TOGGLE CLAMPS for
QUICK POSITIVE
CLAMPING

In Any
Position



**DANLY MACHINE
SPECIALTIES, Inc.**

2122 South 52nd Avenue, Chicago, Ill.; Milwaukee,
Wis., 513 East Buffalo Street; Long Island City, N.Y.,
36-12 34th Street; Dayton, Ohio, 990 E. Monument
Avenue; Detroit, Michigan, 1549 Temple Avenue;
Rochester, N.Y., 16 Commercial Street; Cleveland,
Ohio, 1745 Rockwell Avenue; Philadelphia, Pa.,
3913 N. Broad Street. Ducomm Metals & Sup-
ply Co., Los Angeles, Calif.; San Francisco, Calif.

**DANLY PRECISION
DIE SETS &
DIE MAKERS' SUPPLIES**



FAMCO ARBOR PRESSES FOOT PRESSES

Scientifically designed, accurately ma-
chined from selected materials.

40 STOCK SIZES and MODELS (bench and
floor types). Immediate shipment from
stock.

Write for prices and literature

FAMCO MACHINE COMPANY
1320 18th St., Racine, Wis.

Displaying Duro Products

The counter display shown is Duro Metal Products Co.'s innovation of sup-
plying a complete assortment of popu-
lar size V-pulleys — couplers — flange
and crown pulleys and also "V" belts



in cartons which form an attractive
two-color counter display. This dis-
play is shipped set up. The dealer
merely has to insert a back panel dis-
play behind boxes. The consumer as
well as dealer is assisted greatly by
the size of each piece being printed
on container. The back of each box
carries a complete speed range listing
of all desired speeds afforded by vari-
ous combination of driven and powered
pulleys. So outstanding is this innova-
tion of packing and displaying such
products that dealers nationally are
said to be praising the set-up.



New Fafnir Transmission Units

The Fafnir Bearing Co., New Britain, Conn., announces a new series of ball bearing pillow blocks and other transmission units incorporating Fafnir "Mechani-Seal" ball bearings.

The new streamlined light series pillow blocks, flange cartridges and cylindrical cartridges, in addition to the "Mechani-Seal" construction, offer ease of application. They are locked to the shaft with a finger-twist. No machining shaft shoulders, adapters or lock-nuts are required.

The "Mechani-Seal" employs close tolerances rather than rubbing material and is said to impose no friction or drag. Two steel plate shields form the innermost members. They are tightly fitted to the bearing outer ring. An outer corrosion-proofed, steel plate shield, pressed on the inner ring, clears these inner plates by definite but close tolerances, and acts as an efficient slinger. After prolonged tests in a dust box "torture chamber," it is said that these bearings showed no contamination of the grease within them.

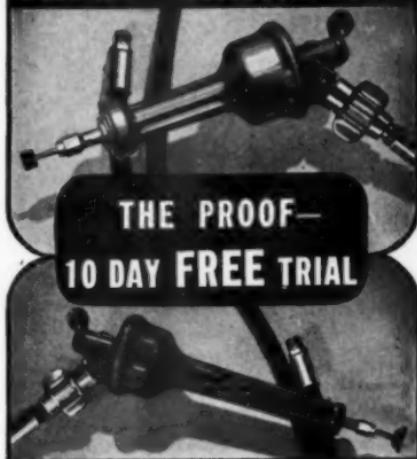
The new transmission units, interchangeable with the separately sealed Fafnir units which preceded them, are available in Types LAK (pillow block), LCJ (flange cartridge) and LC (cylindrical cartridge). A descriptive folder is available.

DoAll Saw Booklet

A new 32-page booklet is offered by DoAll Saws, 1201 Thacker St., Des Plaines, Ill.

The first half of the book explains the variables that are found in several types of narrow saws; shows how they are used and cutting speeds that should be employed on various materials. The center spread of the booklet shows the plant layout in which the saws are made. The last half of the book is devoted to actual case histories of testing jobs and are submitted by customers. One feature of the new plant, explained in the booklet, is the research and testing laboratory to help solve problems that arise for customers.

CUT COSTS-SAVE TIME TRY THESE SENSATIONAL KIPP^{air} GRINDERS



THE PROOF—
10 DAY FREE TRIAL

This FREE trial offer permits any concern with a satisfactory credit rating to try out any Kipp Air Tool for ten days. Grinders sell from \$9.75 to \$58.75, Chippers and Filters at \$19.75. The BB Grinder shown at top is only \$25; the AG Grinder, lower view, is \$19.75. Kipp Air Tools give you highest speeds, lowest prices and are proving indispensable in tool rooms and production departments. New catalog gives details.

**FREE!
TEN-DAY
TRIAL**



**FREE!
AIR TOOL
CATALOG**

- Send Kipp Air Grinder Model _____ on your 10 day Free Trial Offer!
- Send the New Kipp Air Tool Catalog!

Name _____

Company _____

Address _____

MADISON-KIPP CORPORATION

207 WAUBESA ST., MADISON, WIS., U.S.A.

Precision Drill Grinder



Simple to operate—dependable—speedy—this Precision Grinder will enable you to produce perfect points on standard twist drills in sizes from No. 41 (.096) to $\frac{1}{2}$ " (.625).

Send today for more details.

Star Machine & Engineering Corp.

Division Star Electric Motor Co.
Bloomfield, - - - New Jersey

Metal-Turning and Balancing

The Gisholt performance data sheets, constituting the current release, describe representative metal-turning jobs performed on turret and automatic lathes, and an example of static-dynamic balancing on a Dynetric balancing machine.

The metal-turning installation stories are based on the production of oil well plugs, steam traps and tractor hub bushings. They include such data as operation sequence, feeds, cutting speeds, tolerances and machining times. Photographs and drawings are used to illustrate the machining of the work piece and the machine tooling.

The balancing data explains how the elimination of unbalance produced smoother running spindle whorls and longer bearing life for a manufacturer of rayon spinning machines.

Copies of these case histories, Nos. 62 to 65, may be had by writing to Gisholt Machine Co., 1185 East Washington Ave., Madison, Wis.

OTC GRIPOMATIC PULLERS

For PLANT MAINTENANCE Capacities 5 to 50 TONS

Patented grip prevents slipping, avoids damage, eases work in close quarters. Alloy steel—guaranteed.

OTC PULLING SYSTEM

includes many sizes and types. Pushers and Pullers to install or remove gears, bearings, wheels, pulleys, sleeves, shafts, etc.

Write for catalog.

SPECIAL PULLERS designed. Ask us about your special tool needs.



OWATONNA TOOL CO.
115 CEDAR ST. OWATONNA, MINN.

Work Wanted

A NATIONALLY KNOWN MANUFACTURER OF PRECISION MACHINERY HAS FACILITIES FOR TAKING ON ADDITIONAL WORK for: W. & S. Turret Lathes, Boring Mills, Lathes, Punch Presses, Screw Machines, Precision Cylindrical and Internal Grinding, also Sub or Full Assembly Work.

BOX 142

c/o Hitchcock Publishing Co.
508 S. Dearborn St., Chicago, Ill.

Defense Boosts Gage Business

Largely as a result of National Defense and foreign war orders, the gage industry this year has shown a phenomenal increase. Reports from individual manufacturers show business gains ranging from 100 to 600 per cent or more, over last year.

Prime reason is that the production of war materials to government specifications requires accurate gaging, with the result that companies who formerly were working to wider tolerances, or were engaged in work which did not require close gaging are now finding it necessary to acquire precision inspection tools.

Particularly is this true of the myriad of small shops throughout the country which are coming into the National Defense picture as sub-contractors.

This development has taxed the production resources of producers of many forms of gages, particularly ring, plug, and thread gages. As a result, there is a tendency among purchasers toward specifying long-life gages, such as the chrome plated and cemented carbide types on the theory that their effective life, despite somewhat higher cost will provide long term economies and help to relieve the strain on gage production capacity.

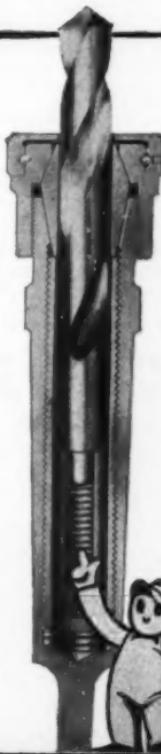
Thus, Lincoln Park Tool and Gage Co., is currently running 100 per cent ahead of last year, with the company's carbide gages at approximately 225 per cent of 1939 levels. The Taft-Peirce Mfg. Co. also reports more than a doubling of 1939 gage production volume, chrome plated and carbide types showing a somewhat higher proportion of the total volume than last year. Detroit Tap and Tool Co., reports demand for thread plug and ring gages 600 per cent ahead of last year and is just completing a plant addition, doubling production capacity. Ford Motor Co., has experienced a gratifying increase in the demand for Johanssen gauges.

5 QUICK FACTS

**ABOUT UNIVERSAL
ADJUSTABLE DEPTH
SINGLE PURPOSE
COLLET CHUCKS . . .**



- NO TANG REQUIRED
- USES BROKEN OR WHOLE STRAIGHT SHANK DRILLS
- CONCENTRIC WITHIN .001
- POSITIVE GRIP
- ADJUSTS WITHIN .002 DEPTH



**WRITE FOR
COMPLETE
FACTS AND
PRICES . . .**

UNIVERSAL

**Engineering Company
Frankenmuth, Mich.**

Filing Stainless Steel

A new technical bulletin by the Research Dept., Nicholson File Co., Providence, R. I., emphasizes that the wide spread use of stainless steel in modern industry has created a special filing problem. Stainless steels comprise a group of low carbon alloy steels with a very high chromium content. The most common type of stainless steel, for example, (known as "18-8") contains approximately 18% chromium and 8% nickel. This makes it tough and dense and causes an abrasive action that tends to wear out the teeth of the regular purpose file.

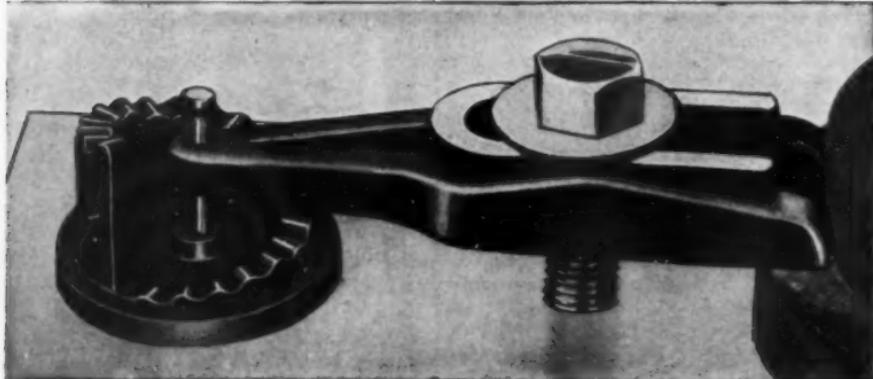
It is true that regular purpose files will cut stainless steel. The trouble is that they become dull too soon. It is therefore important for purchasing and production executives to find files that will not only cut stainless steel but also retain their cutting ability longer against the abrasive action of the hard carbides.

Nicholson claims to have perfected a type of file tooth which has a much longer life when used on stainless steel than regular file teeth.

Stainless steels should be filed with a light pressure and a slow, steady stroke to prevent heating the metal; for when the steel becomes heated it also becomes harder. Consequently filing is more difficult and the teeth wear out faster. It is also important to "keep the file cutting" because otherwise the surface of the metal becomes glazed and therefore more difficult to file.

Nicholson and Black Diamond files for stainless steel are made for fast stock removal on thick-section, and for smooth filing on thin-section stainless steel. In fact they are available in the same shapes, sizes and cuts as regular purpose files. It is important, to specify that the files are for use on stainless steel. The words "For Stainless Steel" are stamped on these files for identification.

K-O Adjustable U-Clamps



K-O Adjustable U-Clamps are made in 3 styles and six sizes.
Cut shows our No. 4 for $\frac{1}{2}$ or $\frac{5}{8}$ in. bolt. Price \$1.25 each.

Send for circular showing all sizes, specifications and prices.

K - O PRODUCTS CO.
BENTON HARBOR,

MICHIGAN

HART'S MILLING FIXTURES

These fixtures will make themselves popular and profitable in your shop. They are easily kept clean to receive the work and may be used in either horizontal or vertical position. Suitable to hold round, hexagonal, octagonal, or square stock, aligning the work with the machine. A very easy setup and fool proof, with a grip that holds the work on the bottom as well as on the back. Shipped in pairs, unless otherwise ordered. Made in 4 sizes— $\frac{3}{4}^{\prime\prime}$ to $4^{\prime\prime}$. We can also supply dividing heads to be used with the fixtures.

Write for descriptive circular.

HART MACHINE CO.
26 Mather St., Dorchester, Boston, Mass.

NOISELESS RIVETERS

by

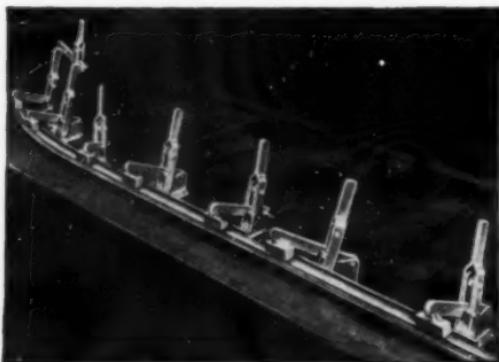
GRANT



Investigate our riveters for yourself. You will find them to be all we say they are and more. You're invited to send unriveted samples for recommendations and quotations.

THE GRANT MFG. & MACHINE CO.
C. E. STATION Bridgeport Conn.

Airplane Wing Parts Held in Position for Welding!



Another application for De-Sta-Co, quick-acting toggle clamps, the efficient method for holding parts during production, as for welding, drilling, reaming, machining or assembly operations. Many large plants now standardize on De-Sta-Co clamps; hundreds of small shops use them regularly. Complete line, all sizes. Send for Bulletin No. 40—illustrates clamps and shows uses.

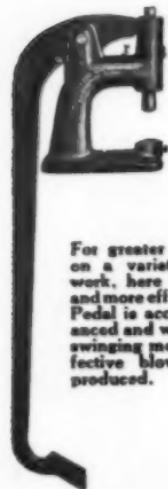
DETROIT STAMPING CO.

Established over 25 Years

347 Midland Ave.,

Detroit, Michigan

Rapid Production of Small Parts Nilson Foot and Power Presses



For greater production on a variety of light work, here is a lighter and more efficient press. Pedal is accurately balanced and with an easy swinging motion, an effective blow is easily produced.



These Presses are designed for rapid production of small parts. The operator is relieved of actual labor and his work is merely control of a semi-automatic machine.

Safety clutch is provided which absolutely prevents repeating, regardless of whether or not the treadle is released. By turning a handle the press is instantly converted into a continuously running machine.

Our No. B O Foot Press and No. B 2 Power Press are shown. We also manufacture a No. B 3 Power Press which is larger and more powerful. Our Power Presses can be equipped with toggle feed, dial feed, or wire straightener and former.

Let us send you complete details.

The A. H. NILSON Machine Co.

BRIDGEPORT, CONN., U.S.A.

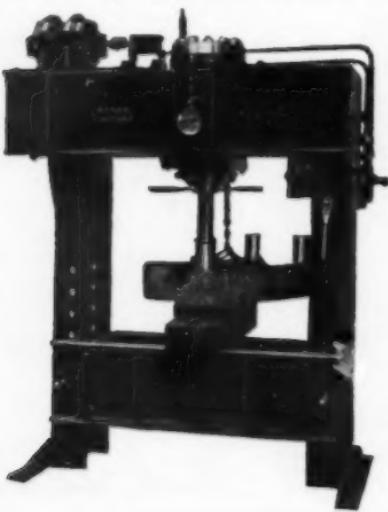
Elmes Offers New Hydraulic Press

A large volume and wide variety of general shop work can be handled with

low power cost by the new type Elmes Hydraulic Press shown. With a 12" screw adjustment, plus a 12" stroke of ram, this model has a total stroke of 24". The platen is adjustable by means of a ratchet gear. Control is by a single lever, and maximum accessibility during operation is obtained in a simple but strong frame construction of all-welded steel. Capacities and sizes to suit any requirements are available, beginning with a model powered by a 1-½ h.p. motor. Specifications will be furnished by Charles F. Elmes Engineering Works, 224 North Morgan St., Chicago, Ill.

Ahlberg Improves Pillow Blocks

Ahlberg Pillow Blocks, Series EC, are now equipped with Neoprene (synthetic rubber) seals to protect the bearings and retain lubricant. These seal rings turn with the shaft and float in the housing. They are said to be of the effective labyrinth type, frictionless and long-wearing. Complete units consist of full self-aligning, precision ball bearings, mounted in one-piece Parkerized, accurately machined, housings.



Join The Chain Making Gang

Nilson Chain Making Machines

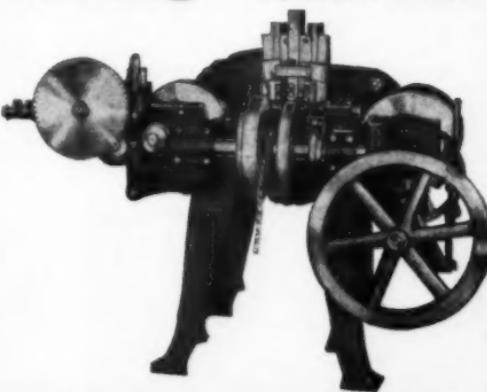
To make a full line of standard size chains as known to the trade, Nilson makes the four necessary sizes of machines. The chains made by these machines are strong, durable, safe and flexible.

The most important feature of the chains made by these machines is that ends are tucked in, making them perfectly smooth on both sides, and increasing the tensile strength 20%.

These chains are smooth to handle and will run through the bushings without injury. They will run accurately on sprockets for conveyor or power transmission purposes.

We also make machines for forming the straight welded chain, for twisting the chain, and for forming the cross chain and hook.

Send for our bulletin today.



The A.H. NILSON Machine Co.

BRIDGEPORT, CONN., U.S.A.

Compact and simple, the design lends itself to light and normal service where



reliable yet inexpensive bearings are required. Picture reference:—(1) Self-aligning ball bearing, (2) Sturdy one-piece housing, (3) Removable end cap, (4) No-drag labyrinth seals, (5) Simple mounting wrench. Further details may be obtained from Ahlberg Bearing Co., 3046 West 47th St., Chicago, Ill.

Trumark Junior Protractor

It is asserted that accurate layouts

for any angle, cut on flat or round surfaces, are made instantly with the new Trumark Junior Protractor. That time and material are saved through accurate cuts made without the use of templates or involved calculations.

On any rectangular form, the instrument is held squared to the edge or corner, the desired angle is set on the protractor scale, and the line marked. The mark goes completely around T or channel shapes. For machining, the forward edge of the instrument shows the exact angle of any cut, or can be used as a marking edge on small cuts.

For marking pipe, the Trumark is held firmly in place by the strap. Two levels show exact position for the instrument. The desired angle is set on the 180° scale and the flexible marking arm then scribes a line completely around the pipe.

The protractor is all die cast, with marking arms held in true position by special fibre discs. These instruments are produced by the Tru-Line Corp., 6022 Wilshire Blvd., Los Angeles, Cal.

Ohio Speed Reducer

More than a year's field tests are said to have preceded the announcement of a new, small, speed reducer, designated as "B H U" by Ohio Gear Co., 1333 E. 79th St., Cleveland, O. Its dimensions are $5\frac{3}{8}$ " by 3", with a height of $5\frac{5}{8}$ " which makes it especially adaptable for use with fractional h.p. motors.

It is offered in three assemblies with

output shaft projecting to right, to left or to both right and left. Six stock ratios are available between 10:1 and



48:1. A bronze worm wheel and a hardened ground worm operate in Timken roller bearings. Torque capacity is 150 inch-pounds.

100%

Adjustable

SHOP

SPOTLIGHTS

Price \$2.50 in single lots
\$2.35 in lots of six
F.O.B. Chicago

CATALOG FURNISHED ON REQUEST

CHICAGO DIE CASTING MFG. CO.
2502 W. Monroe St. Chicago, Ill.

Flexible Shaft Tools

Recently published and free upon request is a new catalog on portable workshops and flexible shaft tools and accessories. It features in illustration and description, the "tool with the flexible shaft and pencil-size handpiece", for the modern craftsmen—professional and amateur. Also pictured and described is the complete line of accessories available for use. Address the Foredom Electric Co., 27 Park Place, New York City.

for your lathes

SENECA FALLS

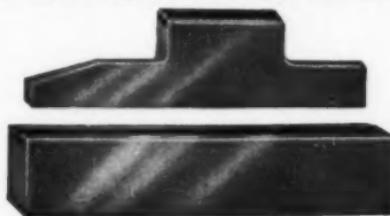
Automatic

WORK DRIVER

Self Centering . . . Quick Acting . . . No Slip. Attaches to any chuck plate or spindle. Provides a slip-proof, balanced drive reducing chatter. Handles rough forgings or turned pieces—straight or taper. Eliminates dogging time. Reduces tool breakage. Write for details and size range.

SENECA FALLS MACHINE CO., 314 Falls St., Seneca Falls, N. Y.

LENGTHEN LIFE OF...
CENTERLESS GRINDER BLADES



- 10-30 Times Longer Life
- Reduce Replacement Costs
- Do Not Mark or Score Work
- Improve Accuracy and Efficiency

WHEN Tipped WITH
TUNGSTEN CARBIDE WEAR STRIPS

Made in Any Length, Shape or Size

METAL CARBIDES CORPORATION
YOUNGSTOWN, OHIO

Shear Cut

END MILLS

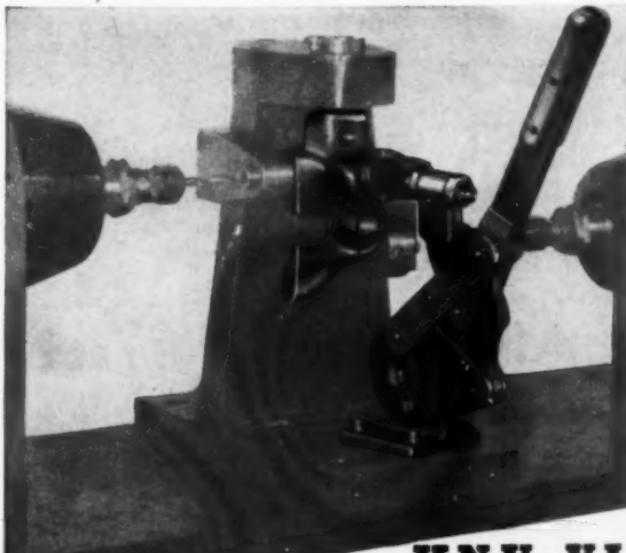


You **Save** Time,
Trouble and Money
by specifying
PROGRESSIVE
Shear-Cut End Mills.
They cut faster,
easier and leave the
smooth finish you
want.

Write **TODAY** for
catalog and prices
on the complete
PROGRESSIVE Line

PROGRESSIVE TOOL & CUTTER CO.

2345 WOLCOTT ST. • FERNDALE, MICH.



SPEED-UP

Those clamping operations with **KNU-KAM-KLAMPS**, the most satisfactory method of holding production parts in dies, jigs and fixtures. Parts varying in thickness are held without need of resetting adjustment bolts, wear also being automatically taken up by cam.

KNU-VISE INC.

16841 HAMILTON AVE.,

DETROIT, MICH., U. S. A.



Announcing The New Silver King Industrial

This specially designed Industrial Unit combines at low first cost features such as one gallon gasoline per hour fuel economy with a rugged Hercules 1 X B-4 Engine, and variety of tractor equipment, which is optional. Model illustrated is Standard with 6:00 x 9 front and 7:50 20 rear traction tires. Push plates hitches and rear floor deck. We would be pleased to give you more information.

CULLMAN SALES CO.

New York
Tribune Bldg.

Detroit
1702 Kales Bldg.

"Cutting and Grinding Facts"

A new 60-page booklet illustrates more than 46 of the most modern machine tools and gives actual performance data about these machines running at rated capacity.

It includes machining data on the latest lathes, milling machines, hobs, drillers and grinders. And this machining data includes essential information to aid the operator or production executive in achieving efficiency of production. It includes such important information as: — materials being machined, spindle speed, depth of cut, feed and cutting lubricant used, etc.

In addition to this performance data, each page carries a brief, but valuable, statement that applies to metal working-facts that will help every metal worker produce more and expend less effort.

In addition to the pages devoted to machining and grinding operations, the book also devotes several pages to other metal working operations such

as: — Pipe Threading, Cold Rolling, Quenching and Tempering, Metal Cleaning, etc., etc. These features certainly make this big Sunoco book a worthwhile addition to the library of anyone interested in metal working.

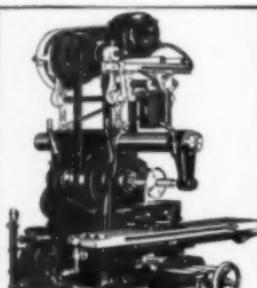
If you desire a copy write on your business stationery, to Sun Oil Co., Dept. 10, Philadelphia, Pa.

Form Tool and Cam Catalog

A new 16-page catalog, No. 7 is announced by Tool Engineering & Mfg. Co., 134 Thurbers Ave., Providence, R.I. In an attractive and comprehensive way, it presents the complete line of automatic screw machine form tools, circular cutoff and chamfer tools, cams, tool blades and bits, cylindrical plug gages, etc.

Furnace Data

An attractive new bulletin No. 83, issued by Despatch Oven Co., Minneapolis, Minn., presents helpful ideas and suggestions on how to improve tempering and drawing results in connection with tool and die furnaces.



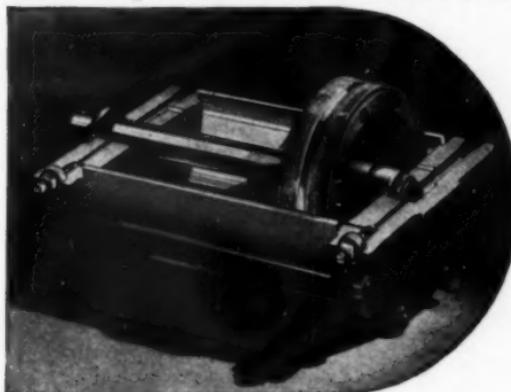
All muscle! No fat!

One Remco brace rod is worth 100 lbs. of cast iron. Strong, rigid, this Remco Motor Drive is built like a bridge. Three point suspension, instead of one or two points. Vibrationless! No overhang. No strain on tool. Simple installation. Low price. Investigate! Folder FREE—write. Remco Products Corp., State St. at R. R., York, Pa.

REMCO MOTOR DRIVES

for LATHES, SHAPERS, DRILLS, MILLING MACHINES, etc.

adjustable "cushioned" air cylinder strokes



**CUSHIONED
AIR CYLINDER**

this is a TOMKINS-JOHNSON product

The action of the cushioned part of an air cylinder stroke depends on variables that are, at best, difficult to determine. This condition can be offset in part by having this cushion action adjustable. Cushion adjusting screws operate to "slow" or increase the speed of the cushion action.

Furnished as standard equipment on T-J Cushioned Air Cylinders, these screws may be readily adjusted and locked in position on the job. Write for catalog 36-A to the Tomkins-Johnson Co., 605 N. Mechanic St., Jackson, Michigan.



**ELIMINATE COSTLY HAND
SANDING AND FILING—
use a PEERLESS
SURFACING MACHINE**

In many instances, a rapid cut on a Peerless may eliminate an expensive milling or planer operation. Much costly hand sanding and filing may be eliminated through the use of these machines. The advantages of a straight-grained finish and the economies in time and material resulting from use of the abrasive belt method warrant careful consideration of Peerless Surfacing Machines. 4" to 20" width of belt. Vertical and Horizontal. Also Reed High Speed Sensitive Drills.

May we send you a bulletin giving full details?

PRODUCTION MACHINE COMPANY
GREENFIELD,
MASSACHUSETTS

Toggle-Clamp Template Kit

Designers and lay-out men know the time and energy consumed in selecting, figuring and detailing toggle clamps to hold parts in production fixtures.

Detroit Stamping Co., 3400 W. Fort St., Detroit, announces a De-Sta-Co Toggle-Clamp Template Kit. The templates are drawn to actual dimensions and scaled precisely to De-Sta-Co new measurements—which permit selection of the proper toggle clamp for each particular condition. All you do then is place the template on your board, under your drawing paper, and in a few minutes you can trace the toggle clamp in correct position and exact size.

The kit contains 18 different templates, ranging from light up to air operated heavy duty models reproduced on hard finish parchment paper; enveloped in lasting fibre—with each tem-

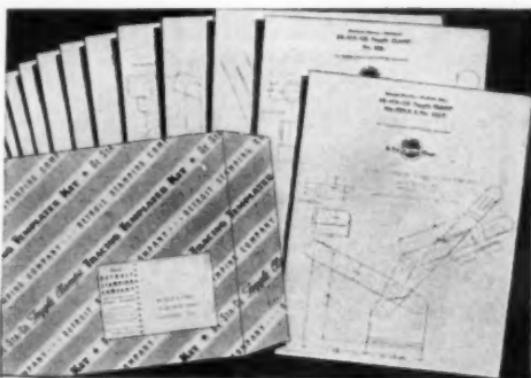
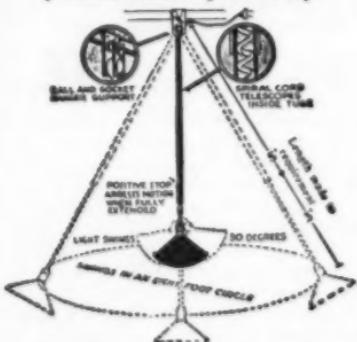


plate easy to find.

The kits will be sent on request, without charge, so long as they last, to accredited Tool Designers, and of course to other Executives who might have occasion to use Toggle Clamp Templates to help make their work easier.

Light—Universal Movable Stays Put best for machine shop and drafting room and avoid glare or head strain. (Fastened above your work).



Push it up, pull it down, swing it out, swing it around, it stays put.

Write for Literature.

J. Zabora Machine & Gear Co.
1321 S. Mint Street, Charlotte, N.C.



JACKSON MILLING AND BORING MACHINE

This machine is specially designed for High Speed Precision and Production Milling and Boring pockets, slots, angles, and compound angles up to 90° without disturbing the

work in the machine. Rigidly constructed of best materials to prevent vibration. Working surface of table 8¹/₂ x 24¹/₂. This is not just "another" machine. It merits your investigation.

WRITE TODAY.

**JACKSON MACHINE & TOOL CO.
JACKSON MICHIGAN**

MICHIGAN BOULEVARD
WHERE
CHICAGO
LIVES

• The pulse of the city—Michigan Boulevard. Chicago works and plays to the tune of its rhythmic hum. In the most convenient location on this famous thoroughfare, Hotel Auditorium provides spacious pleasant rooms, excellent service and superb cuisine, at reasonable rates.

WITH BATH from \$2.50
WITHOUT BATH from \$1.50

GEO. H.
MINK
Mgt.



MICHIGAN
AT
CONGRESS

HOTEL AUDITORIUM



SAVE
Labor
and
Time

Eliminate heavy lifting. Cut handling costs. Table swivels and locks in any position. Can be varied $15\frac{1}{2}^{\circ}$ by slight foot pressure, leaving operator's hands free. Engineered and built by tool engineers, experienced in production of special machines, dies, jigs and fixtures for exacting requirements.

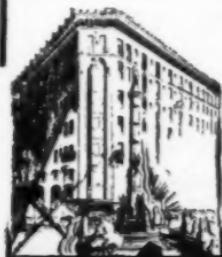
Send TODAY for illustrated catalog No. 2.

MIDWEST TOOL & ENG. CO.
112 Webster St., Dayton, Ohio

**What Do You Demand
In a Good Hotel?**

Do you like well-appointed, homelike rooms, comfortable beds, good food at reasonable prices, a safe place for your car?

Must your hotel be conveniently located to business, stores, theatres?



If those are the things you demand in a good hotel, you'll like Hotel Lafayette.

Rates

Single.....\$2.50 up
Double.....4.00 up
Special rates for 4 or more.

Write for Folder J.

Hotel **LAFAYETTE**
BUFFALO, N.Y.

NIELSEN
Heavy Duty
Live
Centers

*Write for
catalog on
live centers*

Adapted for heavy duty work. Precision type ball and roller bearings assure maximum capacity for high speed production and long service.

NIELSEN, INC. LAWTON,
MICH.



MOHR Universal DRILL VISE

Effects surprising savings in tooling and operating time. A quality-built, sturdy drill vise that operates on cam principle. Simple, positive action. Handles a wide range of work with just a few inexpensive bushing plates and adapters. 9"x5" wide over base. Write for details or order today on money-back guarantee. \$29.75 F.O.B. Chicago.

29⁷⁵

MOHR LINO-SAW CO. 126 N. Union Ave., Chicago, Ill.

"Truth in Advertising" organizations should hear no complaints from W. H. Caldwell, Christiansburg, Ohio, a village of about 500 population located in an agricultural section. He was told that an arc welder would "pay for itself out of profits" — so he purchased a Hobart Welding Generator and, with parts salvaged from a Reo car that had been in a wreck, built this attractive portable welding outfit on a two wheel trailer equipped with air brakes.

That the outfit is more than paying for itself under Mr. Caldwell's operation and management is evidenced by the fact that he has steadily kept his payments on the generator paid up two months in advance of due dates.

(Photo courtesy of Hobart Brothers)



Ziegler Issues New Catalog

A new catalog is announced by W. M. Ziegler Tool Co., 1924 12th St., Detroit, Mich. It covers the complete line of Ziegler roller drive floating tool holders. Copies will be sent on request.



THERE'S A HILLIARD CLUTCH FOR EVERY JOB... Over-Running—Friction—Single Revolution—Slip—Special THE HILLIARD SINGLE REVOLUTION CLUTCH

An automatic clutch for intermittent and positive drive. Especially valuable for cutting or punching operations, packaging machinery, etc. Simple trip makes it suitable for mechanical, electrical or manual control. Write for booklet giving full information.

THE HILLIARD CORPORATION - 126 W. 4th St., Elmira, N. Y.
Chicago Office, 201 North Wells St.

HILLIARD CLUTCHES • ELMIRA, N. Y.

Skilsaw Compact Belt Sander

A lightweight 2-1/4" belt sander called the "Zephyrplane Junior" is announced by Skilsaw Inc., 5035 Elston Avenue, Chicago. Small and compact, it is a highly efficient machine for home craftsmen, for boat owners and in industrial art classrooms. It is a time and money saver in lumber yards when used for "clean-up" work on sash and doors and also in cabinet shops where it is used on many "final finish" operations. It is said to have usual "big-tool" features.

Among these are a die-cast aluminum frame; ball-bearing construction and a powerful, sturdy universal motor; a bakelite handle for cool comfort,



a safe trigger-type momentary switch and a patented "touch-control" lever which permits quick changing of belts. The belt travels at a speed of 600 sur. ft., per minute, is kept uniformly taut by a coil spring and can be centered by a simple adjustment. A variety of belts is obtainable, adapting the tool for use on wood and metal, for removing varnish and for polishing.

Net weight is 9½ lbs.

No. 16 Toggle Punch Press

This is just one of the many types of presses that are manufactured by BEATTY. We are also the builders of various styles of Punches, Shears and heavy duty Machine Tools.

Send us your specifications.



**BEATTY MACHINE &
MANUFACTURING CO.**

HAMMOND, INDIANA

Mechanics Through the Ages



THE FIRST GOLDS

OR CUT TACKS WERE PROBABLY THOSE THAT JEREMIAH WILKESON OF CAMBRIDGE, R.I., SHEARED OUT OF OLD CHEST LOCKS AND HEADED IN A SMITH'S VICE (ABOUT 1775). HIS FIRST SMALL NAILS WERE CARVED OUT OF OLD SPANISH HOOPS, ALSO HEADED IN A CLAMP.



ALTHOUGH MANY SHOPS

OF THE 1850'S WERE EQUIPPED WITH SCREW CUTTING LATHES, MANY MACHINISTS PREFERRED TO CHASE SCREW THREADS BY HAND. DAY IN AND DAY OUT, TOOL MEN CHASED 6 OR 8-PITCH THREADS ON STEEL SHAFTS WITHOUT SPOILING A SINGLE PIECE!



"TO 'CODDL' PREJUDICED MECHANICS, SHOP OWNERS OF EARLY 18TH CENTURY EUROPE WERE OBLIGED TO EQUIP THEIR 'NEW FANGLED' FOOT-WHEEL-OPERATED CONTINUOUS-MOTION LATHES WITH THE OLD-FASHIONED OVERHEAD SPRING BOW OR POLE SO THAT OLD-TIMERS COULD STILL EMPLOY THE FAMILIAR RECIPROCAL MOTION IF THEY SO DESIRED



Federal Presents the Wonder Cutter

A sturdy and compact little cutter that should be useful in many industrial fields, is introduced by The Federal Foundry Supply Co., 4602 East 61st St., Cleveland, Ohio.



Small enough to go in out-of-the-way places, it cuts wire and rods up to $\frac{5}{8}$ round ($\frac{1}{2}$ square) and band iron up to $\frac{1}{8}$ " x 2". An adjustable stop provides for gauging the length of pieces. It is equipped with hardened cutters that are claimed to last indefinitely—and powerful leverage assures easy operation. It is offered on a trial basis for tests in your own shop.

SCHAUER Speed Lathes



For
Finishing
Lapping
Polishing
small parts

Production necessities; timesavers. Specially designed to handle finishing operations more speedily and at lower cost.

*Write for circular
No. 380.*

SCHAUER 2064 Reading Road, Cincinnati, Ohio



(Pronounced COLE'-MON-OY)

12 PROVEN REASONS *Why You Should Specify*

COLMONOY

NICKEL BASE HARD FACING ALLOYS

1. Gives longer life
2. Resists wear, corrosion and galling
3. Can be more easily applied
4. Less facing material required
5. Smoother flowing
6. Lower melting point
7. Less welding time required
8. Less preheating required
9. Applies to all ferrous-base metals
10. Can be hot wiped
11. Finishing to a high polish minimizing friction
12. Does not service check

WRITE FOR CATALOG

Contains full information concerning all the various grades of COLMONOY that meet every hard-surfacing requirement.

WALL-COLMONOY CORP.

Sixth Floor, Buhl Bldg., Detroit, Mich.

558 W. 54th St. 2854 W. Harrison St.
NEW YORK CHICAGO

208 Midway Building 3155 Seneca St.
TULSA BUFFALO

123 W. Philadelphia St.
WHITTIER, CALIF.

COLMONOY

Hard Surfacing Alloys and Overlay Metals

1" x 12' Plate Shear for U. S. Navy

The 10012 series All-Steel Shear shown has a capacity of 1" mild steel 12' long. It was built recently by the Cincinnati Shaper Co., for the U. S. Navy Yard, Norfolk, Va.

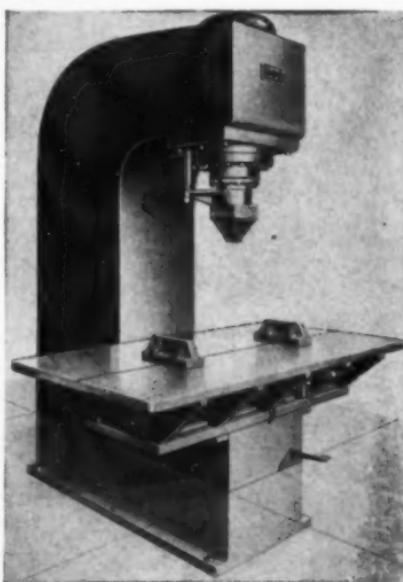
The machine is of rolled steel plate construction, 12'3" between housings, and is equipped with fluorescent light beam shearing gauge, hydraulic hold-downs, micrometer ball bearing back gauge, and four edge solid one-piece knives. Net weight is approximately 88,000 lbs.

100-Ton Straightening Press

Hannifin Mfg. Co., 621-631 S. Kolum Ave., Chicago, announce a new straightening press with a capacity of 150 tons. It is provided with a large table to facilitate straightening of steel castings and similar work. Base of press is designed for installation below floor level, to bring table to a convenient height for easy handling of bulky pieces.

The Hannifin sensitive pressure control is used, allowing extremely simple and accurate handling. Operation of this type of control is said to allow unusually rapid handling of straightening operations, with finger-tip or light foot control of ram movement and ram pressure. Ram movement both up and down, and pressure control are accom-

plished by means of single hand lever or pedal.



Initial movement of control lever causes ram to move down rapidly at nominal pressure. The ram will move down until it touches the work, and

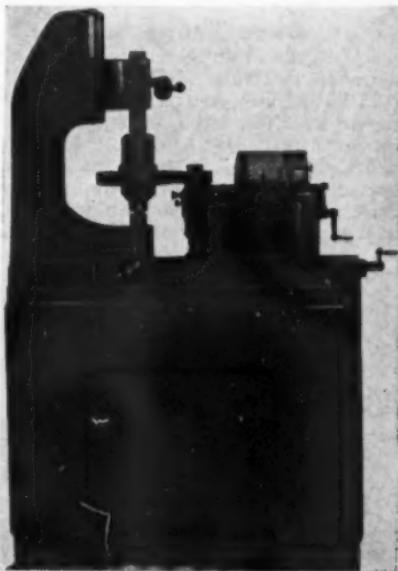
then stop. Movement of the control lever beyond the approach position causes pressure to be exerted by the ram, with working pressure proportional to the distance the control lever is moved. Any required ram pressure up to the capacity of the press, is obtained merely by moving the control lever down. Releasing control lever at any point automatically returns ram to top position with a high speed return stroke.

The motor driven hydraulic power unit is built into base. Press frame is welded, and all piping is concealed. Dimensions are: — Stroke 20", Gap 30", Reach 30", Table 54x96".

No. 20M Fellows Red Liner

The Fellows Gear Shaper Co., Springfield, Vermont, has developed a new machine for checking gears. This is known as the No. 20M Red Liner and will handle spur or helical gears up to 18" pitch diameter. It operates on the same fundamental principle as the regular Red Liner but is arranged to handle gears on centers which are adjustable. The lower center is adjustable to present the gear in the correct relationship to the master gear, and the upper center for handling gears or arbors of different lengths. This machine can also be arranged for checking internal gears by the use of a suitable holding fixture. The machine is equipped with a 1/20 h.p. motor, capable of operating on a.c. or d.c. current, and can be operated conveniently from a regular light socket. The machine can also be operated by hand. The charting mechanism is similar to that

employed on a regular Red Liner. This machine is particularly applicable to airplane engine gears and other classes of work demanding a high degree of accuracy in inspection. As it magnifies errors 200 times, it indicates the



condition of the tooth surface, as well as errors in cutting and inaccuracies resulting from heat treatment.

Skilsaw Issues New Catalog

A bright and interesting new catalog (No. 42) is announced by Skilsaw, Inc., 5035 Elston Ave., Chicago, Ill.

The First Step in Defense Production

Milliken Bench Plates and Angle Irons

In laying out work and setting up most machines you will find the adaptability and accuracy of Milliken plates and irons indispensable. Priced to appeal to every machine shop operator. Shipments from stock. Write now for specifications and prices.

Milliken Machine Company

23 Prospect Place,

West Newton, Mass.



In it the complete line of Skilsaw portable electric tools is illustrated and described. Practicability of all tools and their finer construction points are thoroughly shown in working pictures and detailed specifications are given for each tool.

Duro Tilting Saw

A new 10" Tilting Arbor Saw is announced by Duro Metal Products Co., 2655 N. Kildare Ave., Chicago, Ill. Designed to take large work, a capacity up to 3-3/9" depth of cut has been provided. It has a table top working surface of 1080 sq. in. The base was designed to be solid and rigid, by using heavy gray iron castings for the frame.



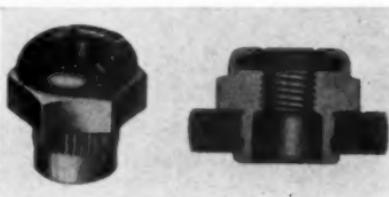
Outstanding features include a chute that guides saw dust past the working parts; built-in compartment for extra saw blades; Deluxe mitre gauge; heavy rip-fence—that locks at both front and rear—saw guard; splitter and anti-kick-back.

Heretofore, there have been some difficulties in using standard motors on tilting arbor saws. Duro stresses the development of a motor mounting design that takes any standard motor. It is possible to use any suitable motor that may be available with this saw, or if it should be necessary to replace

a motor in the future, a special motor with particular specifications is not required.

Clinch Type Stop Nut

For fastening sheet-metal assemblies in which the parts must be removed readily and returned to position, a clinch type of self-locking nut with knurled shank is offered by Elastic Stop Nut Corp., 2332 Vauxhall Road, Union, N. J.



To install the nut, a hole is drilled in the structure and the shank is pressed into the hole. The mouth of the shank is then spread against the back of the structure to effect a clinching hold. The knurling engages the drilled surface and thus assists in eliminating any turning of the nut.

The head of the nut is fitted with the characteristic vulcanized fiber collar. This collar, being unthreaded, resists the entrance of the screw, thus automatically taking up all thread play and bringing the load-carrying thread faces of nut and screw into a tight pressure-contact.

Handbook for Drillers

A very useful "Handbook for Drillers" has been issued by the Cleveland Twist Drill Co., 1242 E. 49th St., Cleveland, Ohio. This handy, pocket-sized manual contains a large number of clear, large-scale illustrations of the appearance and actual operation of twist drills.

There are detailed articles on the important parts of a twist drill, points on grinding, drill speeds and feeds, and miscellaneous helps. Practical shop men will also find the tables useful. They cover cutting speeds, basic thread dimensions, tap drill sizes, and counter-bore sizes for cap screws and machine screws.

LATEST EQUIPMENT CATALOGS

Check the Items in Which You Are Interested and Mail to

Hitchcock Publishing Co., 508 South Dearborn, Chicago

Please limit your choice to the ten items in which you are most interested.

- | | | | |
|---|---|--|---|
| <input type="checkbox"/> Abrasive, cloth, paper | <input type="checkbox"/> Cement, disc grinding wheel | <input type="checkbox"/> Drill Twist | <input type="checkbox"/> Grease |
| <input type="checkbox"/> Adapters, adjustable | <input type="checkbox"/> Centering Machines | <input type="checkbox"/> Drills, attachments, high speed | <input type="checkbox"/> Grinders, air |
| <input type="checkbox"/> Arbors & Mandrels | <input type="checkbox"/> Centers, lathe | <input type="checkbox"/> Drills, automatic | <input type="checkbox"/> Grinders, bench |
| <input type="checkbox"/> Balancing Ways | <input type="checkbox"/> Chains, silent, roller | <input type="checkbox"/> Drills, bench | <input type="checkbox"/> Grinders, disc |
| <input type="checkbox"/> Baling Presses | <input type="checkbox"/> Chain Drives | <input type="checkbox"/> Drills, fully geared | <input type="checkbox"/> Grinders, external |
| <input type="checkbox"/> Band Saw Machines | <input type="checkbox"/> Chamfering Machy., auto. | <input type="checkbox"/> Drills, multiple spdl. | <input type="checkbox"/> Grinders, flex. shaft |
| <input type="checkbox"/> Bar Cutters | <input type="checkbox"/> Chucks, air | <input type="checkbox"/> Drills, portable elec. | <input type="checkbox"/> Grinders, hand |
| <input type="checkbox"/> Bars, boring | <input type="checkbox"/> Chucks, collet | <input type="checkbox"/> Drills, radial | <input type="checkbox"/> Grinders, internal |
| <input type="checkbox"/> Bearings, Ball | <input type="checkbox"/> Chucks, drill & tap | <input type="checkbox"/> Drills, sensitive | <input type="checkbox"/> Grinders, ped., elec. |
| <input type="checkbox"/> Bearings, oilless | <input type="checkbox"/> Chucks, lathe | <input type="checkbox"/> Drives, variable | <input type="checkbox"/> Grinders, swg. frame |
| <input type="checkbox"/> Bearings, roller | <input type="checkbox"/> Chucks, magnetic | <input type="checkbox"/> Emery Wheels | <input type="checkbox"/> Grinders, pol., belt |
| <input type="checkbox"/> Bearings, tapered roller | <input type="checkbox"/> Clamping devices, air operated | <input type="checkbox"/> End Mills | <input type="checkbox"/> Grinding Attach. |
| <input type="checkbox"/> Bearings, thrust | <input type="checkbox"/> Coil Winding Equip. | <input type="checkbox"/> Engraving Machines | <input type="checkbox"/> Grinding, centerless (contract) |
| <input type="checkbox"/> Belt Fasteners, metal, leather | <input type="checkbox"/> Collets, feed fingers | <input type="checkbox"/> Etching Mach., elec. | <input type="checkbox"/> Grinding Mch., belt |
| <input type="checkbox"/> Belt Lacing | <input type="checkbox"/> Comparators | <input type="checkbox"/> Exhaust Blowers | <input type="checkbox"/> Grinding Mch., inter. |
| <input type="checkbox"/> Belt Sanders | <input type="checkbox"/> Compressors, air | <input type="checkbox"/> Extractors, tap | <input type="checkbox"/> Grinding Mch., cut., reamer and tool |
| <input type="checkbox"/> Belts, V Type | <input type="checkbox"/> Controllers | <input type="checkbox"/> Facers, spot | <input type="checkbox"/> Grinding Machines, portable elec. |
| <input type="checkbox"/> Bending Machines, hand | <input type="checkbox"/> Conveyors | <input type="checkbox"/> Fans, exhaust, elec. ventilating | <input type="checkbox"/> Grinding Mch., surf. |
| <input type="checkbox"/> Bending Machines, power | <input type="checkbox"/> Counterbores | <input type="checkbox"/> Files | <input type="checkbox"/> Grinding Mch., tool |
| <input type="checkbox"/> Bending Machines, angle iron | <input type="checkbox"/> Counting devices | <input type="checkbox"/> Filing Machines | <input type="checkbox"/> Grinding Service |
| <input type="checkbox"/> Bending Machines, hydro | <input type="checkbox"/> Couplings, shaft | <input type="checkbox"/> Filing Room Equip. | <input type="checkbox"/> Grinding Spindles |
| <input type="checkbox"/> Bending Machines, pipe | <input type="checkbox"/> Cranes, traveling | <input type="checkbox"/> Flangers, hand, pwr. | <input type="checkbox"/> Grinding Wheels |
| <input type="checkbox"/> Bending Rolls | <input type="checkbox"/> Cranes, locomotive | <input type="checkbox"/> Flexible Shaft Equip. | |
| <input type="checkbox"/> Blocks, chain | <input type="checkbox"/> Cranes, portable | <input type="checkbox"/> Floating Holders | |
| <input type="checkbox"/> Blowers | <input type="checkbox"/> Cut-off machines | <input type="checkbox"/> Forges | |
| <input type="checkbox"/> Blueprint Machy. | <input type="checkbox"/> Cutter grinders | <input type="checkbox"/> Forging (Upsetting) Machinery | |
| <input type="checkbox"/> Bolt & Nut Machy. | <input type="checkbox"/> Cutters | <input type="checkbox"/> Forgings, drop | |
| <input type="checkbox"/> Boring Heads | <input type="checkbox"/> Cutting Compounds | <input type="checkbox"/> Forgings, upset | |
| <input type="checkbox"/> Boring, drill. Machy. | <input type="checkbox"/> Cylinders, air | <input type="checkbox"/> Forming Machines | |
| <input type="checkbox"/> Boring & Turn. Mills | <input type="checkbox"/> Demagnetizers | <input type="checkbox"/> Foundry Equipment | |
| <input type="checkbox"/> Boring Machines, jig | <input type="checkbox"/> Diamonds | <input type="checkbox"/> Furnaces, hardness | |
| <input type="checkbox"/> Boring Tools | <input type="checkbox"/> Diamond Tools | <input type="checkbox"/> Furnaces, heat treating, Electric | |
| <input type="checkbox"/> Brakes, hand, power | <input type="checkbox"/> Die casting machines | <input type="checkbox"/> Furnaces, heat treating, oil or gas | |
| <input type="checkbox"/> Brazers, electric | <input type="checkbox"/> Die Sets | <input type="checkbox"/> Gages | |
| <input type="checkbox"/> Broaching Machine Tools | <input type="checkbox"/> Die Sinking Machines | <input type="checkbox"/> Gage Blocks | |
| <input type="checkbox"/> Buffers | <input type="checkbox"/> Die Stocks | <input type="checkbox"/> Gages, comparator | |
| <input type="checkbox"/> Bulldozers | <input type="checkbox"/> Die Cushion | <input type="checkbox"/> Gages, dial | |
| <input type="checkbox"/> Burnishing Machy. | <input type="checkbox"/> Die Duplicating Machines | <input type="checkbox"/> Gages, plug, ring, snap | |
| <input type="checkbox"/> Bushings, brass | <input type="checkbox"/> Die Filers | <input type="checkbox"/> Gages, taper | |
| <input type="checkbox"/> Bushings, bronze | <input type="checkbox"/> Dies, blank, forming | <input type="checkbox"/> Gages, thread | |
| <input type="checkbox"/> Bushings, hardened | <input type="checkbox"/> Dies, hole punching | <input type="checkbox"/> Gears | |
| <input type="checkbox"/> Bushings, jig | <input type="checkbox"/> Dies, thread rolling | <input type="checkbox"/> Gear Blanks, non-met. | |
| <input type="checkbox"/> Bushings, steel | <input type="checkbox"/> Dies | <input type="checkbox"/> Gear Cutting Machy. | |
| <input type="checkbox"/> Cabinets, filing | <input type="checkbox"/> Dividing Heads | <input type="checkbox"/> Gear Testing Machy. | |
| <input type="checkbox"/> Cabinets, tool | <input type="checkbox"/> Drill pins, steel | <input type="checkbox"/> Gears, cut | |
| <input type="checkbox"/> Case Hardening Furnaces | <input type="checkbox"/> Drafting Machines | <input type="checkbox"/> Gears, rawhide and non-metallic | |
| <input type="checkbox"/> Castings | <input type="checkbox"/> Drawing Instruments | <input type="checkbox"/> Gear Pumps | |
| | <input type="checkbox"/> Dressers | <input type="checkbox"/> Generators | |
| | <input type="checkbox"/> Drill Presses | <input type="checkbox"/> Goggles | |
| | <input type="checkbox"/> Drill Bushings | | |
| | <input type="checkbox"/> Drills, electric | | |
| | <input type="checkbox"/> Drill grinders | | |
| | <input type="checkbox"/> Drill speeders | | |
| | | | |

Continued on following page

- Lathes, bench
- Lathes, polishing & buffing
- Lathes, toolroom
- Lathes, turret
- Lathes, spinning
- Lathes, extension bed and gap
- Layout fluid
- Layout plates
- Lift Jacks
- Live Lathe Centers
- Lock Form. Mch., pr.
- Lubricants
- Lubricating systems

- Mandrels, ex. & solid
- Magnetic chuck de-magnetizers
- Marking machines
- Meters
- Micrometers
- Milling attachments
- Milling Machines
- Milling Mch., bench
- Milling Mch., hand
- Milling Mch., univ.
- Milling Mch., horiz.
- Milling Mch., plain
- Milling Mch., vert.
- Mold & Die Cop. M.
- Molded plastic prod.
- Molybdenum
- Motors
- Motor-generator sets
- Motor drives, univ.
- Motor starters

- Name plates
- Nibbling Machines
- Nut setting equip.
- Nut tappers

- Oil cups
- Oil and grease seals
- Oil groovers
- Oils, cutting
- Oils, lubricating
- Oils, quench. & tem.

- Patterns
- Pillow Blocks
- Pins, header & dowl.

- Pipe, cutting and threading mch.
- Plate Rolls
- Press Brakes
- Press Feeds
- Presses, arbor
- Presses, bench
- Presses, broaching
- Presses, foot
- Presses, forming
- Presses, hydraulic
- Presses, inclinable
- Presses, power
- Presses, punch
- Presses, screw
- Presses, percussion
- Presses, straighten.
- Profiling Machines
- Pumps
- Pumps, coolant, lubricant & oil
- Punching Machy.
- Punches & Dies
- Pyrometers

- Racks, gear, cut
- Racks, bar stock
- Radiators, Japanning-oven
- Reamer Holders
- Reamers
- Reamers, adjustable
- Reamers, taper pin
- Reaming machines
- Regulators, temp.
- Rivets
- Riveting Machines
- Rod Cutters
- Rope drives
- Rotary Converters
- Rotary Files
- Router Bits

- Sand Blast equip.
- Sanders
- Saws
- Saws, Band
- Saws, Blade
- Saw Sharpening Mch.
- Sawing Machines, circular & frict.
- Screw Drivers
- Saws, cir. met. cut.
- Screw Cutting Tools

- Screws, cap, set, saf. set & machine
- Screw Drivers
- Screw Mch., auto.
- Screw Mch., hand
- Screws
- Scribers
- Separators, oil
- Shapers
- Shafts, flexible
- Shafts, hangers and boxes
- Shapers, horiz.
- Shapers, vertical
- Shapers, structural
- Shears, bevel
- Shears, electric
- Shears, hand
- Shears, power
- Shears, slitting
- Shears, splitting
- Shears, throatless
- Shears, rotary
- Shears, squaring
- Sheave wheels
- Shelving, steel
- Shop lights
- Sine Bars
- Slotting machines
- Sockets
- Soldering Tools, elec.
- Speed Reducers
- Spring coiling and forming machy.
- Sprockets
- Stampings
- Steel
- Steel Stamps
- Stocks, die
- Storage Racks
- Straightening Mch.
- Stripping Units
- Swaging Machines

- Tap Holders
- Tapping Mch. & Al.
- Taps, collapsing
- Thread Grind. Mch.
- Thread Rolling Mch.
- Tool bits, hi. sp. st.
- Tool Holders
- Toolmakers Instrumts.
- Tools, boring
- Tools, cutting

After checking the items in which you are interested, tear out the page and mail it to The Hitchcock Publishing Company, 508 South Dearborn Street, Chicago, Illinois.

Kindly send catalogs and information on items we have checked.

Name _____ Title _____

Firm Name _____

Street _____

City _____ State _____

Be SURE to enclose letterhead, billhead, or business card

Classified Section

USED AND REBUILT MACHINERY

Lists of Used and Rebuilt Machinery, either For Sale, Wanted, or For Exchange, set in uniform style, will be published in the Classified Section at the rate of \$5.00 for your name and address and a five line advertisement. For additional lines, 40c per line.

Write directly to those offering the machine for sale, for prices and full descriptions. If what you seek is not advertised, write Hitchcock Publishing Company, Chicago, making known your wants on either new or used machinery and the publisher will gladly pass them along to the advertisers.

FOR SALE BY

**Aaron Machinery Co.,
176 Lafayette St., New York, N. Y.**

Boring mills, 3 $\frac{1}{2}$ ", 4" bars, Binsee.
Brake, 8"x10 gauge capacity D. & K. power leaf.
Die sinker, Jackson No. 4, s.p.d.
Drill, P. & W. No. 13, multiple spindle.
Eyeletting machines, Model B U. S.
Gear hobsers, G. & E. and Shuchardt & Schutte.
Grinders, Head internal, No. 50, 55, 60, 65.
Grinders, Norton, 10x36", m.d.
Grinder, Head No. 70 internal, m.d. serial 3080.
Lathes, Hendey, 14x6, 16x6, 20x10.
South Bend Taper, 16"x8 m. d., new.
W. & S. No. 4, 12 speed, geared head, bar feed, m.d.
L. & S. 16x6, 12 s.p.d., s.e.c. hd., taper, Lehmann 16x8.
Rahn-Larmon 20x10, 16x8 taper, P. & W. 16x6, s.p.d.
Walcott 26x12", raising blocks 36", Crawford, 24x10.
Miller, Brown & Sharpe, No. 3 plain, latest cone.
Miller, Milwaukee 18" Univ. div. nds., vert., s.p.d.
Millers, vertical, Becker, b.b., No. 2, A 2, 3, 4.
Miller, 48" Ohio, tilted top.
4-Slide machines, Nilson, (3).
Radials, 3", 3 $\frac{1}{2}$ " American, 4" Mueller.
Hydraulic presses, pumps, accumulators.
Shapers, Stockbridge, Rockford 16", 20", 24", 28".
Automatic screw machs., B. & W., No. OOG., ser. 8000
Spot welders, Federal, 30 K. W., 24" arms.
Turret lathes, Millholland, P. & W., 1" to 24" bar.
Turret lathes, 26" Libby, 7/8" hole, m. d.
Turret lathe, 24" Steinle, 64" spdl., grd. hd., m.d.
Turret lathes, Gisholt 21", 24".

**General Blower Company
401 N. Peoria St., Chicago, Ill.**

BLOWERS—FANS—EXHAUSTERS.
For Dust Collecting—Ventilating.
Oil and gas burners, cupolas, furnaces, etc.
Roots—Conversville and centrifugal blowers.
What are your blower requirements?

**Chas. E. Lowe Co.
174 Pearl Street Hartford, Conn.**

AUTOMATICS

1" G Gridleys, preloaded, b. b. spindles, 17000 serial. (2)
1" G Gridley, Timken r. b. spindles, 10000 serial.
1" Cones, 900 serial. (2)
1" New Britain Grid., four spdl. preloaded b. b. (2)
2 $\frac{1}{2}$ " and 3 $\frac{1}{2}$ " J. Gridley, s. a.
2 $\frac{1}{2}$ " and 3 $\frac{1}{2}$ " A Cleveland.
Thread millers, Waitham, 2". (3)
National Acmes No. 53 and No. 55, m. d.

FOR SALE BY

**Siegman Machinery Co., Inc.
561 W. Washington Blvd., Chicago, Ill.**

Bandsaw, Marvel No. 8, 18x18, m. d., b. b.
Corrugated roll, 48".
Grinder, Head 70, Ex-Cell-O spindles (2).
Grinder, Norton 12x36, motor drive, cylinder.
Grinder, tool & cutter, Cincinnati No. 1.
Grinder, tool & cutter, Wilmarth & Mormon, No. 1.
Grinder, Rivett internal.
Grinder, Brown & Sharpe No. 23, cutter grinder, m.d.
Grinder, Landis 14", universal.
Lathe, Warner and Swasey No. 6.
Lathe, American, 15x6, c.q.g.
Lathe, Carroll Jamieson.
Lathe, 24"x12" Schumacher-Boye, l. c. g.
Mill, American No. 2.
Shear, Niagara power, 8", 14 ga.
Swager No. 3 $\frac{1}{2}$ Langeler.

Please send us your inquiries.

**E. L. Klauber Machinery Co.
3221 Olive St. - - - St. Louis, Mo.**

Band saw, Racine, 2 speed, motor drive.
Gear hoist, No. 000 Schuchart & Schutte.
Hardness tester, Rockwell.
Lathe, Cataract, 1" and 4", bench unit.
Lathe, 14": 16"x6" Monarch; Reed Prent., q.c.g., tap.
Presses, No. 4 R & K o.b.i., No. 69N Bliss, dbl. action.
Screw machine, Cataract bench, 4" with collets, etc.
Shapers, 16" Cincinnati; 16"-20" Ohio.
Threading machines, Landis S. H., 1 $\frac{1}{2}$ " and 2".
Turret lathes, Bardon & O.; Wood tilted No. 1, 2 & 3.

**Surplus Material & Machinery Co.
8735 Kercheval Ave., Detroit, Mich.**

Boring mill, 36" Bullard vertical, single head.
Boring mill, Model B Becker vertical, c. p. d.
Boring mill, No. 6 Becker vertical, c. p. d.
Furnaces, electric draw, Leeds-Northrup, 4 $\frac{1}{2}$ to 17 $\frac{1}{2}$ K. W. (5).
Grinder, No. 24 Gardner disc, horiz., 53" dia., m. d.
Lathe, 14"x10" Hendey geared head, taper attachment,
direct motor drive.
Leveler, 11 roll Voder, 4x5 $\frac{1}{2}$ " rolls.
Screw machine, 14" Cleveland Model M, 4 spindle
automatic, direct motor drive.
Shears, squaring, power, 36" to 12", (10).

USED AND REBUILT MACHINERY

FOR SALE BY

B. D. Brooks Co., Inc.

119 Broad St. Boston, Mass.

Sheet metal working machinery, hand and power.
All types of new and reconditioned equipment.
Apron brakes, press brakes, shears, folders.
Bending rolls, corrugating rolls, forming rolls.
Punches, beaders, rotary machines, stakes, etc.

Bleser Machinery Company

209 N. Sixteenth St., - Springfield, Ill.

Air compressor, auto. unit, 5 h. p.	\$150
Drill presses, 20" to 34".	
Lathe, 15" x 16" LeBlond, q. c. t. a.	360
Hammer, power trip, 25 lb. Little Giant.	75
Press, punch, 14" stroke.	85

Joseph Hyman & Sons,

Tioga and Almond Sts., Philadelphia, Pa.

WORLD'S LARGEST STOCK
POWER PRESSES

No. 7 Bliss, double crank, tie rod, 45", crank 7"-8".
No. 5C Bliss, double crank, tie rod, 44", crank 5"-5".
No. 65 E Niagara, gap, gdr., double crank, 72".
No. S 206 Ferracute, dbl. crank 124", crank 7 1/2"-9". (2)
No. SG 107 Ferracute, dbl. crank, 90", crank 54".
STG 103 Ferracute gap, double crank.
Nos. 93B and 91C, Toledo double crank presses.
No. 2719 Hamilton, straight side, tie rod, crk. 13"-19".
Nos. 744 & 759, Bliss geared, straight side.
No. 58 Niagara, geared, straight side.
Nos. 54, 55, 55½ Toledo, geared straight side.
Nos. 38(B) & 38(C) Blisstoggle presses.
No. 164½ Toledo toggle, press.
Nos. PA2 Ferracute & 13 Toledo horning.
No. 662 Toledo, 250 ton knuckle joint, coining.
75 ton EG 51 Ferracute; 400 ton Waterbury-Farrel,
knuckle joint, coining.
200 ton No. 59 Bliss, 250 ton Waterbury F. coining.
100 ton No. 21 Bliss.
Bliss roll forming machine, 5 pairs rolls for stock up
to 25" wide, 4" bearings, weight 25,000 lbs.
Squaring shears, various sizes.
Gang slitter, 60", Lamb & Nash (Braddock) type H.
These and hundreds of others of popular makes and
sizes, are in stock at our warehouse here.

Rebuilt and Guaranteed.

Reliance Machinery Sales Company
1407 Brighton Place, N.S. Pittsburgh, Pa.

Air compressors, 139 and 450 cu. ft.
Borer, car wheel, for 42" wheels.
Grinder, Bath 13x22" univ.
Hammer, 300 lb. Bradley, upright helve.
Hammers, 50 lb. Mayer upright, m. d.
Miller, hand, No. 1 U. S.
Planer, 42"x36"x22" Cincinnati, 4 heads.
Press, No. 21½ Bliss, blanking, m. d.
Press, horning, No. 48 Bliss.
Press, No. 82-C Toledo dbl. crank, 8" shaft, 44" wide.
Press, No. 94-A Toledo dbl. crank, 6" shaft, 6" stroke,
46" wide.
Roller leveler, 54", 17-44" rolls, m. d.
Shapers, 16, 20 & 24" b. g. crank.
Shear, plate, 100" Toledo, 4" plate, m. d.
Shear, plate, 36"x3" Toledo, m. d.
Shear, bar, No. 14 W. W., 2" rounds.
Slotted, 15" Bement, crank, 36" rot. table.

What do you need? What have you for sale?

FOR SALE BY

S. M. Regar Machinery and Mill Supplies

Tampa, - - - - - Florida

Boring mill, Binsec horiz., table type, 4" spindle.
Cold saw, Higley m. d. No. 27-36", takes blade 38".
Hammer, Lingle 50 lb. power, arranged m. d.
Hammer, Williams White. Yeakley type, 400 lb. pneu.
Screw machines, Model F, Gridley, #. (4)

D. E. Dony Machinery Co.

47 Laurelton Rd., - Rochester, N. Y.

Bumping hammer, No. 2 Pettingell.
Gear hobber, No. 1 Adams.
Lathe, 26"x10" Bridgeford.
Mill, 24"x24"x10" Ingersoll, 3 heads, fixed rail, m. d.

C. R. Daniels

1514 W. Capitol Drive, Milwaukee, Wis.

Air compressor, 6x6 Curtis single, water cooled, vert.
Broach, No. 3, La Pointe belt drive.
Lathe, 11"x5" Seneca Falls, fully equipped.
Welder, 300 amp. Lincoln, portable engine driven.
Welder, 300 amp. P-H, portable engine driven.

Wiener Machinery Co.

237 Centre St., - New York City

Bevel gear generator, 16" Gleason, m. d.
Hack saw, 6x6 Racine shear cut, m. d.
Lathe, 20"x18" Reed, g. c., instant motor drive.
Mill, No. 5 Cincinnati, h. p., p. l., s. p. d., slotted nose.
Shaper, 16" Gould & Eberhardt, b. g.

Nelson Machinery Co., Green Bay, Wis.

Drill, 28" sliding hd., -H. W. L. & G. P. F. -belted.
Grinder, Cochrane Bly No. 11S auto. saw, cap. 10" to 22".
Grinder, Niles-B-P. 13x36 Universal Mfg., belted.
Hobber, Barber Colman No. 12.

Alex Zeeve

2280 Woolworth Bldg., New York, N. Y.

Drills, radial, 4" Dresses, gear-box, m. d., box table; 2" American, gear-box, s. p. d., swinging table, others.
Flanger, 4" McCabe pneumatic, lot of die-blocks.
Keyseaters, No. 6A Mitts & Merrill, arranged m. d.
Nos. 2 and 1 Baker, fully equipped, belt drive.
Lathes, engine, 53"x34" Nicholson-Waterman, geared faceplate, taper; 29" (raised on blocks to 39")x20" Rahn-Mayer-Carpenter semi-q. c., 27"x14" Greaves-Klusman q. c., bowl head, 3-step, d. b. g.; 24"x16" Whitcomb-Blaidsell q. c., 4-step, d. b. g., taper; 29"x10" Lodge & Shipleys q. c., bowl head, 3 step, d. b. g., taper; 14"x8" Hendey q. c. geared head, s. p. d.; others.
Planers, 26"x26"x6' Pond; 16"x16"x3" P. & W.; others.
Shapers, 24" Steptoe, gear-box, s. p. d.; 20" Whipple, b. g. cone; others.
Shears, 8"x1" Lennox rotary splitting, m. d.; No. 316-B Niagara circle; No. 112 (4") Marshalltown throatless, m. d.; No. 2 Doelger & Kirsten alligator, (24" knives) m. d.; No. 1½ Doelger & Kirsten alligator, (24" knives) m. d.; others.

WHAT MACHINERY HAVE YOU FOR SALE?

USED AND REBUILT MACHINERY

FOR SALE BY

Factory & Mill Supply Co., Inc.
176 Federal St., - Boston, Mass.
 Grinder, Fitchburg plain cylindrical, 6" x 20" direct motor drive, complete with motor, 220 volts, 60 cycles, 3 phase. In excellent condition. Price \$750. F.O.B. cars, Boston.
 Turret lathe, 24" Acme flat, 3 step cone, friction backed geared head, bar and chucking equipment, belt drive, \$1050.

FOR SALE BY

The Elyria Belting & Machinery Co.
Elyria - - - - - Ohio
 Bulldozer, Ajax, 10" stroke.
 Cut-off machine, Bardons & Oliver.
 Lathe, 16x6" Cisco tool room.
 Punch and shear, Oeking combination.
 Saw, Wagner hydraulic cold-cutting.
 Scrap baler, Galland-Henning, will make bale 6" x 14" x 64" x 100 lbs.

Lang Machinery Company

Air compressors, Ingersoll-Rand XKB-2, 600, 888, 1200 & 1500 cu. ft. 100 lb. pressure, motor drive.
 Air comp., W.J.-3 Sullivan, angle comp., 468 c. f.
 Air comp., 14"x12" Ing. Rand "E.R.-1", 466 c. f.
 Bolt cutter, 1" Landis, 14"-3" Acme, s.g. hd., b. d.
 Bolt cutters, 1" Acme, Landis hds., 2 & 3 spnd.
 Bolt cutter, 2" Acme, Landis head, b. g. b. d.
 Boring mill, 30" Bullard, threading attach., s. p. d.
 Boring mill, 42" Bullard, 2 swivel heads, s. p. d.
 Boring mill, 42" Calburn, grd. fds. 2 hds., s. p. d.
 Boring mill, 52" Bausch, geared feeds, d. c. m. d.
 Boring mill, 75" Niles, 2 heads, fric. feed, b. d.
 Boring mill, 10" Niles, 2 heads, belt drive.
 Boring mill, horiz. 38" bar Binsee, knee type.
 Boring mill, horiz. 38" bar D & H, floor type.
 Boring mill, horiz. 5" bar Barrett, b. d.
 Boring mill, horiz. 64" bar Niles, floor type.
 Buffer and polisher, 78 h. p. Marschke, 220/3/60.
 Crane, 5 ton Shaw 50' span, 3 motors, d. c.
 Drill, radial, 6" Morris, t. a. m. d.
 Drill, radial, 6" Cincinnati-Bickford, t. a. m. d.
 Drills, upright, 14" to 32", beltdrive & m. d.
 Drill, No. 3 Avey s.g. spnd., 12" o. h., b. d.
 Drill, upright 36" Snyder, p. f. b. d.
 Drills, 4-spnd. Avey No. 2 M. T. b. b. m. d.
 Gear cutter, 48"x12" Gould & Eberhardt, s. p. d.
 Gear hobber, No. 12 Barber Colman, s. p. d.
 Gear hobber, No. 2 S & S, cap. 38"x12", m. d.
 Grinder, No. 51 Oliver drill, m. d.
 Grinder, Dillon dbl. end, 78 h. p., 220/3/60/1750 r. p. m.
 Grinder, disc, 18" Diamond, dbl. end.
 Grinder, surface, 8"x10" x36" Norton, hydr. fd., m. d.
 Grinder, surface, No. 1 W & M, b. d.
 Grinder, universal, No. 1 B & S, b. d.
 Grinder, universal, No. 4-A Landis, b. d.
 Grinder, tool & cutter, Cin. table 24"x23" b. d.
 Grinder, internal cylinder, No. 5 Landis, b. d.
 Grinder, 78 h. p. Stand. Elec. Co., dbl. end, 220 v., d. c.
 Hammer, 30-lb. Bradley upright strap.
 Hammer, 100-lb. Bradley cushion helve, belt drive.
 Hammer, power, 300-lb. Bradley upright helve.
 Hammer, power, No. 4 Beardy, b. d.
 Hammer, steam drop, 1000-lb. to 8000-lbs.
 Hammer, 2000 Erie board drop.
 Keysator, Davis, cap. 5" belt drive.
 Keysator, M. & M. No. 5-94".
 Keysator, No. 2 Baker, str. 34", cap. 2", b. d.
 Keysator, No. 3 Baker, stroke, 26", m. d.
 Lathe, 12"x6" Prentice, geared head, q. c. g., s. p. d.
 Lathe, 14"x6" Porter, p. c. g., t. a. b. d.
 Lathe, 16"x9" Bradford, grd. head, m. d.
 Lathe, 16"-24"x8" South Bend gap lathe, q. c. g., b. d.
 Lathe, 18"x8" South Bend, p. c. g., s. b. g., b. d.
 Lathe, 20"x14" Bradford, p. c. g., b. d.
 Lathe, 20"x10" Johnson, p. c. g., s. b. g., m. d.
 Lathe, 20"x10" Monarch, q. c. g., d. b. g., b. d.
 Lathe, 20"x10" Hamilton, grd. hd., q. c. g., s. p. d.
 Lathe, 22"x16" Bradford, q. c. g., d. b. g., b. d.
 Lathe, 24"x10" Bradford, q. c. g., t. a. b. d.
 Lathe, 24"x11" Lehman, grd. hd., 16 speeds, m. d.
 Lathe, 27"x11" LeBlond, grd. hd., q. c. g., d. b. g., m. d.
 Lathe, 28"x14" Schumacher & Boye, p. c. g., t. a. b. d.
 Lathe, 30"x14" Schumaker & Boye, q. c. g., b. d.
 Lathe, 36"x18" American, p. c. g., t. a. b. d.

28th St. & A. V. R. R.

Pittsburgh, Pa.
 Lathe, 36"x26" 6" New Haven, p. c. g., b. d.
 Lathe, 40"x16" Fifield, trip. grd., int. face plate dr.
 Lathe, 42"x20" Springfield trip. grd., p. c. g. b. d.
 Lathe, 51"x32" New Haven, triple geared, motor drive.
 Lathe, 46"x17" Pond, p. c. g., triple grd., b. d.
 Lathe, 54"x21" Detrich & Harvey, t. a. b. d.
 Lathe, turret, 14" Millholland, m. d.
 Lathe, turret, 18" Reed, p. c. g., h.s., 18", b. d.
 Lathe, turret, Gisholt, 21", h.s., 2", m. d.
 Lathe, turret, Gisholt 24", h.s., 8", m. d.
 Miller, duplex, 36"x10" Ingersoll, m. d.
 Miller, 24" Cincinnati, auto. duplex, b. d.
 Miller, plain, 10" x Cincinnati, b. d.
 Miller, univ. No. 3 Garvin, div. head, b. d.
 Miller, universal, No. 2 Kempsmith, b. d.
 Miller, universal, No. 4 B & S, b. d.
 Miller, Vert., No. 3 Knight, m. d.
 Miller, Vert. Taylor & Fenn, m. d.
 Miller, universal, No. 1 A-B & S, m. d.
 Miller, rotary 72" Ingersoll, m. d.
 Miller, slab, 20"x24"x12" Ingersoll, adj. rail, m. d.
 Pipe machines, Landis 4" to 2", belt drive, (1).
 Pipe machines, No. 304-B, Oster, m. d.
 Pipe machines, 6" Landis gear box a. c. m. d.
 Pipe machine, No. 308-B Oster, m. d.
 Pipe machines, 8" Williams, 24" to 8" motor drive.
 Planer, openside, 26"x36"x12" Cleveland, 3 hds. m. d.
 Planer, 38"x36"x10" Cin., 3 hds. m. d.
 Press, arch, No. 52 Toledo, str. 48", m. d.
 Press, baling, 13-P Logemann hydraulic, m. d.
 Press, coining, ELG, 4 Ferracute.
 Press, No. 20 Bliss O. B. I., str. 32", m. d.
 Press, No. 87 Blisia foot lever, stroke 14".
 Press, dbl. crank, Stoll 75 D, 72" x26" m. d.
 Press, No. 98 Blisia, dbl. crk., str. 34", m. d.
 Press, No. 18 Bliss o. b. i. str. 14" d. f. flywheel type.
 Press, No. 5 Toledo o. b. i. str. 2", flywheel type.
 Press, toggle, Garrison, 500 ton, bed, 48"x60".
 Press, trimming, No. 2 Billings & Spencer, 80 tons.
 Press 300 ton W-S-M Hyd. Tire. bevel uprs. 44", b. d.
 Press, wheel, 300 ton Chambersburg, m. d.
 Profilers, Nos. E3 and E4, Keller, motor drive.
 Pump, Aldrich triplex, 75 gal. 2000 l. b., m. d.
 Punch & S., Cleveland, 36" thrt. 18"-1", m. d.
 Punch & shear, No. 53 Hendey & Whitt. comb., b. d.
 Punch, lever, No. 58 Niagara, 36" throat.
 Roll, bending, 7" x 1", Pyramid Type, b. d.
 Saw, band Type J.M. Laidlaw, cap. 6", m. d.
 Screw machine, No. 52 National Acme, s. p. d.
 Shapers, 16", 20", 24" & 28", belt or motor drive.
 Shear, 24" G & E, high duty, gear box, m. d.
 Shear, alligator, No. 61 Carlin, 2" round high knife.
 Shear, Alligator, No. 7 United Eng. & Fdy. Co.
 Shear, squaring, No. 6-E Niagara, cap. 72"x14", m. d.
 Shear, plate, 10"x14" United, gap 18", m. d.
 Shear, rotary, No. 10 Quickwork, 14 ga. 68" throat.
 Slotter, 8" Beds, table 30" dia., b. d.
 Slotter, Newton, 12", table 30" dia., b. d.
 Straightener, No. 1 Kane & Roach cap. 5" rd. m. d.
 Straighter, strip & cut., No. 1 Schuster, 32"x18", m. d.
 Welders, 200 amp. Gen. Elec.—200 amp. Lincoln.
 Welder, butt type, 60 Federal, 65 K.W.

USED AND REBUILT MACHINERY

FOR SALE BY

Davis Machinery Company
1-3-5 So. St. Clair St. Toledo, Ohio
 Brake, 4"x3/16" Chicago, power, leaf type, m. d.
 Grinder, No. 2 W. & M., surface, belt drive.
 Grinder, No. 2 Bath universal, with attachments.
 Hobber, 24H Gould & Eberhardt, gear.
 Lathe, 28" x 48" x 18" McCabe 2 in 1.
 Lathe, 21x6" LeBlond hy. duty, g. c. g.
 Lathe, 20"x12" Whitcomb-Blaedell.
 Mill, A. B. Becker, vert, m. d.
 Press, No. 75 Toledo open back, geared.
 Shaper, 34" G. & E. crank, back geared.

R. S. Armstrong & Bro. Co.
676 Marietta St., N. W., Atlanta, Ga.
 Bolt threading machines, b. d., 1^{1/2}" National, 2^{1/2} Landis.
 Compressor, 9x8 I-R, horz., b. d.
 Compressor, 10x10 CPT, horz. b. d.
 Compressor, 12x12 I-R, horizontal, b. d.
 Drill presses, b. d., 35" Barnes, Norton and Aurora.
 Grinders, pl. cyl., 10"x20" Landis, 6"x32" Norton.
 Hammer, 25 lb. Little Giant, power, b. d.
 Keyseaters, No. 2 Davis, m. d. No. 2 M. & M., b. d.
 Lathe, 20"x8' American, OCG, cone drive, rebuilt.
 Lathe, 18"x16" Lodge & Shipley, open grd., hd., m. d., t. a.
 Millers, plain, b. d. No. 2 and No. 4 Kempsmith, No. 16 Valley City.
 Pipe machine, Curtis & Curtis, 28" to 8".
 Radial drill, 4" Western Lo-Hung, m. d., pract. new
 Shaper, 24" Cincinnati, b. d. rebuilt.
 Shear, Thompson bevel patch
 Shear, No. 2 Bethlehem circle, b. d.
 Universal Woodworker, Northfield.

Wm. C. Johnson & Sons Machy. Co.
1211 Hadley St., St. Louis, Mo.
 Air compressors, 15 in stock.
 Bolt threaders, 1^{1/2}, 1^{1/2} & 2^{1/2} Acme.
 Boring machine, 44" Betts.
 Boring mills, 6"-8"-44" Niles.
 Boring mill, King 34", turret head.
 Broach, 3A LaPointe of Hudson.
 Drill, Naco 13 spindles, No. 1 taper.
 Drill, No. 3 Fox, 6 spindles.
 Drill, Moline hole hog, 6-sp. No. 4 Morse taper.
 Drill, radial, 4" Fosdick; 3^{1/2} Mueller, 3" Reed-Prentice.
 Drill, radial, 3" Cincinnati Bickford.
 Drills, radial, Drillmaster, new.
 Gear hobber, No. 8 Adams.
 Grinders, 10"x30" and 6"x18" Landis.
 Hammers, 300 lb. Beaudry, 75 lb. Bradley, 50 & 100 lb. Little Giant.
 Lathes, 16"x6" Greaves Klusman, g. c. g.
 Lathe, 20"x10' Cisco, g. h., t. a., like new.
 Lathes, 22"x12" United States, g. c. g.
 Lathe, 32"x14" Schumacher & Boye.
 Lathe, 42x15 Fisfeld.
 Miller, Cin. production type, 57"x11" table.
 Miller, No. 18 American.
 Pipe machines, 2"-4"-6"-8"-12".
 Pipe machine, 2" Landis.
 Planer, 30"x30"x14" Cincinnati.
 Press, 92B Toledo double crank.
 Presses, Nos. 2, 3 & 4 Marshalltown.
 Presses, 3, hydraulic pump & accumulator.
 Roll, plate straightening, H. & J. No. 2, like new.
 Shapers, 12"-18"-30"-24".
 Shaper, 24" Columbia, motor driven.
 Punches, shears, bulldozers.
 Testing machine, 100,000 lb. Riehle.
 Toggle press, 407A Bliss.
 Large stock guaranteed electric motors. Any size.

FOR SALE BY

Rosenkranz, Weisbecker & Company, Inc.
2308 Singer Building, New York, N. Y.
 Boring mills, 60" Betts vertical, motor drive.
 Gear cutter, 110" Newton, motor drive.
 Grinder, Cincinnati 24", face mill, motor drive.
 Keyseater, No. 20 Catlin, m. d.
 Millers, 3 Ingersoll hor. facing mills, 9" spdis., m. d.
 Miller, P. & H. vertical openside, keyseater, m. d.
 Planer, 54"x54"x10' Rockford, 4 hds., m. d.
 Planer, 36"x36"x12' Chandler, heavy duty, m. d.
 Shear, angle, 8x8x1 Cleveland, turntable, m. d.
 Slotter, 24" Dill, motor drive.

S. M. Regar Machinery and Mill Supplies
Tampa, Florida
 Boring mill, Bickford, s. p. d., horiz., table 33"x60".
 Boring mill, Niles 36", 2 swive heads, vertical.
 Boring mill, Niles 30", 1 swivel head, vertical.
 Lathe, Bement Miles, l. c. g., 36" factory raising blocks, 44"x22" bed.
 Lathe, Gibson, 24", hole in spindle 6".
 Lathe, National 18" production, hole in spdis. 18", cone head, (3).
 Slotter, Bement Miles 16", circular table.

Standard Machinery Co.,
347 Indiana Ave., Grand Rapids, Mich.
 Ball burnisher, Baird No. 1, double barrel.
 Drill, 25" Superior, sliding head.
 Drill grinder, Sellers, 3" capacity.
 Lathes, Porter-Cable Mfg. (2).
 Miller, Brown & Sharpe, 76"x234" table.
 Planer, 36"x36"x10' American, m. d.
 Roll formers, Kane & Roach, 2 sets spdis.
 Rolls, 8"x34" power forming.
 Shaper, 25" Smith & Mills, m. d.
 Tapper, Anderson No. 40 Dial Feed Auto.
 Welder, Thompson Spot 25 KW, foot operated.

Bradley Machinery Co.
211 Joseph Campau - Detroit, Mich.
A FEW ITEMS (PRICED) FROM OUR STOCK
 Air compressor, Bury, 16x10. \$1250
 Automatic, New Britain, 6 spindle, 1"x5" \$1250
 Automatics, New Britain,
 1-16x7 New Britain,
 1"x5".
 Automatics, Brown & Sharpe.
 Bar shear, Doty (new). 330
 Broach, No. 3 LaPointe.
 Cam cutter, Garvin.
 Generator, cam Garvin.
 Drill radial, 8" Cincinnati Bickford. 1350
 Drills, 6 spindle, 2 spindle and single spindle. 600
 Gear hobber, G. & E., 16".
 Gear cutter, 18H G & E.
 Grinder, 12x72 Brown & Sharpe, plain. 650
 Grinder, 16x52 Norton. 750
 Lathes, 24x10, m. d., South Bend, with taper attach.
 Miller, Hendey production type.
 Miller, No. 18B Milwaukee.
 Miller, No. 2 Pratt & Whitney.
 Press, P-3 Fervacut. 250
 Turret lathe, No. 4 B. & O. 200
 No. 4 Warner & Swasey.
 No. 6 Warner & Swasey.
 Turret lathes, No. 6 Warner & Swasey.
 Turret lathes, No. 4 Warner & Swasey.
 Turret lathe, Acme.
 Turret lathe, 2x24 O. & L.
 Hundreds of other items priced low.

USED AND REBUILT MACHINERY

FOR SALE BY

Failor-Strafer Machinery Co.

132 Liberty St., - New York, N. Y.

Boring mill, 3 $\frac{1}{2}$ " bar, D. & H., horiz., floor type.
 Drill radial, Amer. 3" sens., tapping attachment.
 Drill, radial, 3" Mueller, single pulley drive.
 Drill, radial, 6" N. B. P., full univ., arr. m. d.
 Gas furnace, No. 4 American, door opening 8"x14".
 Grinder, Oliver 4 wheel wood tool grinder.
 Grinder, 10"x24" Landis pl., self-contained, m. d.
 Lathes, 42"x26" Davis, m. d.; 22"x14" Davis.
 Lathes, (2) 32" x11' American, triple geared, taper att.
 Lathe, 26"x10" Bridgeford, 3 step cone, taper attach.
 Lathe, 26"x10" Walcott, 3 step cone, d. b. g.
 Lathes, 24" & 5" J. & L., arr. bar work & arr. chucks.
 Miller, 48" Newton continuous rotary, 2 spindles, m. d.
 Miller, No. 2 Milwaukee universal, cone type.
 Pipe machines, 8" Wieland, 4" Williams, m. d.
 Shaper, 18" Potter & Johnson, universal table.
 Shear, 12 $\frac{1}{2}$ x3 $\frac{1}{2}$ " cap. Geo. Ohi Power squaring shear.

FOR SALE BY

Russell Machine Co.

438 Oliver Bldg.

Pittsburgh, Pa.

Boring machine, Barrett 5" dia. bar cylinder.
 Boring mill, 42" Gisholt, 2 heads, m. d.
 Boring mill, 10' Niles vertical.
 Gear cutter, 36" Brown & Sharpe.
 Hammer, 300 lb. Bradley, upright strap.
 Hammer, 1500 lb. Bliss board drop.
 Hammer, No. 2500 dbl. frame Chambersburg steam.
 48" Morton Keyway cutter, cap. 3 $\frac{1}{2}$ " wide.
 Lathe, turret, 24"x26" Pratt & Whitney, g. h. b. d.
 Miller, 24" Cincinnati semi-automatic.
 Pipe cutting and threading machine, 6" Merrill.
 Press, hyd. wheel, 100 ton Caldwell.
 Punch, multiple, No. 64 H & J.
 Shear, 10"x14" United power squaring, m. d.
 Shear, Alligator, No. 61 Carlion high knife, 7 $\frac{1}{2}$ " sq.
 Straightener, No. 1 Shuster flat strip metal, m. d.
 Straightener, No. 1 Kans & Roach, cap. 8" rd.
 Upsetting machines, 2 $\frac{1}{2}$, 3 $\frac{1}{2}$, 4 and 5" Ajax iron bed.

Marr-Galbreath Machinery Company

Air comp., 676 cu. ft. Ing-Rand, XRE. 3/60/440.
 Ball or jar mill, 2-jars 10x13", belt or m. d.
 Blowers, (furnace) No. 2 Knight; No. 3 American.
 Blower, pressure, No. 11-PB Am, 14375 cfm., m. d.
 Bolt cutter, 14" Landis, sgl. head.
 Boring mill, 120" Bettis, 2 hds., m. d.
 Boring mill, 30" Bullard vert., threading attach., b. d.
 Boring mill, vert., 30" King, tur. hd., s. p. d.
 Boring mill, 84" Pond, 2-hds., Fctn. feed, c. t.
 Brake, 5"x12 ga. Chicago, power, belted.
 Brake, crimp and corrugating, 10"x16 ga. Keene.
 Die filling machine, No. 2 Cochran-Bly.
 Die machine, 25 ton Henry & Wright, (near new).
 Driller, horiz., 6" spindle Nat'l. Acme, No. 2 chucks.
 Drills, radial, 2 $\frac{1}{2}$ " & 3" Dresses, Simplex, cone.
 Drills, gang, 3 and 4 spindle, m. d. to MT.
 Exhauster, No. 35 Buffalo, outlet 12x14", m. d.
 Fan, ventilating, 24" American, m. d., 1/40.
 Forging machine, 1" Ajax, cont. motion, m. d.
 Forging mach., 1" Nat'l. cont. mot. Grip Wedge, m. d.
 Forging machine, 14" Acme, all steel, side shear.
 Gear pinion, No. 3 Sloan & Chase, auto. bench.
 Grinder, No. 2 Grand Rapids Tool.
 Grinder, drill, 2" Oliver, m. d.
 Grinder, No. 31 Landis, plain, 10x30", c. s.
 Grinder, portable surface, No. 6-OA, motor, 3/60.
 Grinder, univ. C. & R. No. 3 B. & S.
 Grinding spindle, Excello No. 39, bracket 5002.
 Hack saws, No. 7 & 14 Atkins, belted.
 Hammers, 50 lb. Boss, No. 2, with dies, belted.
 Hammers, S. F., steam, 1100 & 1500 lbs.
 Hammer, 2500 lb. Erie, Arch frame, steam.
 Hammer, 3000 lb. Chbg. steam forging.
 Hammer, 400 lb. Bliss board drop (rebuilt).
 Hammer, 1000 lb. Chbg. steam drop, double frame.
 Hoists, 8 to 10-ton hand chain.
 Hoists, Canton No. 1 portable.
 Hoists, 10-ton Euclid, 3/60/220 (2).
 Keyseater, Morton, cap. 24"x24", s. p. d.
 Lathe, 10"x8" Atlas, with cabinet, m. d.
 Lathe, 11 $\frac{1}{2}$ "x4" Artisan, o. c. g., s. p. d.
 Lathe, 14"x6" Mulliner-Eldlund, o. c. g., t. a.
 Lathe, 14"x6" P. & W., taper att., cone.
 Lathe, 15"x6" C. & J., geared head, m. d., t. a.
 Lathe, 17"x8" Le Blond, o. c. g., cone.
 Lathe, 17"x8" Sidney, o. c. g., Cullinan, m. d.
 Lathe, 18"x8" Bradford, o. c. g., cone (A-1).
 Lathe, 20"x10" Sebastian, g. h., motor drive.
 Lathe, 22"x9" LeBlond plain turning.
 Lathe, 26"x10" Walcott, o. c. g., cone.
 Lathe, 27"x10" Lodge & Shipley, o. c. g., cone.
 Lathe, roll, 44" Hyde Park, m. d.
 Lathe, 36"x20" Springfield, m. d., 230 v. d. c.

57 Water St.,

Pittsburgh, Pa.

Marking machine, No. 3 Noble & Westbrook.
 Miller, mfg. type, Kempsmith, table 44"x12".
 Motors, 15 h. p. West, 3/60/220-440/570 rev.
 Motors, 25 h. p. Allis-Chalmers 3/60/220/650 rev.
 Motors, 30 & 40 h. p., West, C.S. 3/60/220/570 rev.
 Nailing machine, No. 6 Morgan, 8-track, m. d.
 Nibbling machine, No. 1 Campbell, 6" thr. 3/16".
 Nibbling mach., Gray 30" thr. cap. 3/16", m. d.
 Pinion cutter, 10" Sloan & Chase, capacity 1x1".
 Pipe machine, 1" Zarecki, belted.
 Pipe machine, 4" Williams, cap. 4" to 4", m. d.
 Pipe machine, 8" Zarecki, cone or m. d.
 Pipe machine, 18" Wieland "Standard", m. d.
 Planer, 26"x26"x8" Niles, 1 hd., belt m. d.
 Press, foot, Lewthwaite, wt. 400 lb., (4).
 Press, Horn, McSheery, steel, 14"x12", wt. 1000 lbs.
 Press, horn, No. 164 Bliss, plain, stroke 1 $\frac{1}{2}$ ".
 Press, P-3 Fretz, 14" stroke, m. d.
 Press, o. b. i., bench, No. 100-B Perkins.
 Press, sgl. crank, 500 Toledo, str. 8".
 Punch, S. E., 36" Cleve. E.F. 14x1", A. J., dies.
 Punches, s. e., 36", 48", 60" cap. 14" m. d.
 Punch & shr., comb., No. 5 Buffalo, hand, cap. 14"x1".
 Punch & shear, S. E. 6" th. No. 3 L. S. &, rapid a.
 Riveter, 34" h. d., cap. 5/16", high speed, s. p. d.
 Riveter, 102 Grant, m. d., 3/60/220 v. cap. 5/16".
 Rolls, bending, 37x28", DE, Bertach & P.S. & W. 18 ga.
 Rolls, 5"x8" Bertach, initial solid hags, b. d.
 Rolls, 10"x8" United, 2-rolls (for leather).
 Rolls, bending, 16", 18" & 24" drop end, m. d.
 Saws, metal, 4x4" Napier, m. d.
 Shaper, 15" Blount, single geared.
 Shaper, comb., 7" Rhodes, horiz. 38" vert. str.
 Shaper, 29" Columbia b. g. crank, gear box, s. p. d.
 Shapers, 21" Averbeck & American, cone.
 Shapers, 24" Milwaukee & American, cone.
 Shear, bar, No. 1 United, 24" blade, cap. 38" sq., m. d.
 Shear, 60"x1" L & A. 5" gap, belt.
 Shear, Blocks & Blades 52"x8" cap. 1500 lb.
 Shear, rotary No. 2 Standard, cap. 10 ga., b. d.
 Shear, B-36 Stanley Unishear, cap. 14" m. d.
 Shear, O-36 Stanley Unishear, cap. 14 ga., m. d.
 Tapping machine, 1000 lb. Olsen hyd., hand.
 Tearing machines, 1000 lb. Economy hand power,
 Transmission, Reeves No. 06-E. (new)
 Turbines, 100 h. p. Westinghouse, 900 rev.
 Turret lathe, 18"x6" Springfield, Fox Monitor.
 Turret-screw machine, 1"x15" P. & W.
 Upsetter, 18" Acme, all steel.
 Welder, arc, 100 amps, a. c. (near new) (2).
 Welder, arc, 200 amp., a. c. Hampton (new).
 Welder, spot, 5 KVA., Eisler, 8" arms.

USED AND REBUILT MACHINERY

Automatic Screw Machines

$1\frac{1}{4}$ " cone, four spindle, motor driven.
 $7/8$ "-1-1/16" Clev. Model M., 4 sp., M.D.
 $1\frac{1}{2}$ " New Britain, 6 spindle, S.P.D. (2)
 $\frac{3}{4}$ " Gridley, Model F., 4 spindle, S.P.D.
 $\frac{1}{2}$ " Cleveland, Model B., single spindle.
 $1\frac{1}{4}$ " Cleveland, Model F., 4 spindle.
 $2\frac{1}{2}$ " Cleveland, Model A., sgle. spindle.

LAKE MACHINERY CO.
652 W. LAKE ST. CHICAGO, ILL.

FOR SALE BY

Jones Machine Tool Company
Front & Pike Sts., Cincinnati, Ohio

LATHES.

16"x6"	Prentiss geared head, motor drive.....	\$1250
18"x10"	Hendey tie bar, q. c.	1350
18"x8"	Lodge & Shipley, q. c., bowl head.....	900
30"x6"	Sebastian geared head, motor in leg.....	1800
20"x8"	Lodge & Shipley geared head.....	1100
20"x10"	Sidney q. c., bowl head, belt drive.....	950
28"x12"	Boye & Emmes q. c., belt drive.....	1500
30"x16"	American belt drive, (standard change)....	850
38"x14"	Boye & Emmes, belt drive, std. chge.	1250
No. 5 Foster	Foster geared head, universal turret.....	1800

BORING MILL.

42"	Niles single pulley geared feeds, 2 heads....	\$2000
SHAPERS.		
16"	Steptoe plain crank.....	\$ 275
16"	Gould & Eberhardt back geared crank.....	850
20"	Rockford back geared crank.....	675
20"	Steptoe back geared crank.....	675
GRINDERS.		
Nos. 2, 3 and 4 Landis universal.		
No. 1 LeBlond universal tool and cutter grinder.	\$ 475	
No. 60 Heald cylinder with fixture.....	350	
Woods tool and cutter grinder.....	275	
PROFILERS.		
No. 12 Pratt & Whitney 2 spindle.....	\$1200	
No. 13 Pratt & Whitney 1 spindle.....	675	
Reed Prentiss (same size as No. 12 P. & W.).....	1200	
MISCELLANEOUS.		
Punch presses, bolt and pipe threading machines		
Cleveland s.s. automatics, 1& F. Gridley, hack saws,		
radial and upright drill presses, keysetters, etc.		

MISCELLANEOUS WANTS**WANTED FOR RESALE**

Scott Machinery Sales, Inc.
1811 W. Carroll Ave. Chicago, Ill.
 $1\frac{1}{2}$ " Mod. G. $1\frac{1}{2}$ " Mod. G. motor driven, 4 spindle,
Gridley automatic screw machine.

WANTED

W. M. Whitesides Machine Shop
Plainview, Texas
Second hand 12 speed geared head for 20" Lodge &
Shipley Lathe.

**SPECIAL BARGAINS FOR
QUICK SALE**

Gap Lathe, Harrington, 48", 15° between centers, raising blocks
Drill Press, Superior 4-spindle Hi-Speed, 8" overhang, adj. table
Boring Mill, Rogers, 30", vertical swing approx. 36" T&L pulley

PLANERS

36"x38"x16-6" bed, Gray, 2 heads on rail, pulley drive.
26"x26"x8" Hamilton, 1 head on cross rail, pulley drive.

Mill, Becker Lincoln Type, overarm dia. 3-1/2"
9x29-1/2" table

Lathe, 21x8 ft. LeBlond Q.C.G., friction clutch, 3-step cone

GLOBE MACHINERY COMPANY
602 W. Lake St. Chicago, Ill.

FOR SALE

We have just purchased and offer for sale all of the equipment and supplies of the Bruce Dry Dock, Pensacola, Fla. Our representative is at the plant. Your inspection and inquiries invited. Outstanding items in this plant are Bolt Machines, Drill Presses, Hack Saws, Steam Hammer, Hoists, Keyseater, Lathes, Motors, Planers, Punches & Shears, Bending Rolls, Flanging Clamp, Milling Machine, Shaper, and the following Ingersoll Rand Compressor: 25"x15-3/4"x18" horizontal, duplex, 2 stage motor driven Air Compressor, complete in first class condition.

DIXIE MILL SUPPLY CO., INC.
901 Tchoupitoulas St., New Orleans, La.

**USED
SPEED REDUCERS**

All Sizes — Types — Makes

REEVES DRIVES

SAVE 60% OF NEW COSTS

All Materials Overhauled, Guaranteed

SEND FOR OUR STOCK LISTS

Patron Transmission Co.
156 GRAND ST. NEW YORK

USED AND REBUILT MACHINERY FOR SALE BY

Wisconsin Gear & Engineering Co., Inc.
602 So. 2nd Street, - Milwaukee, Wis.
 Gear generators, Bilgram bevel, 6" & 16"; guaranteed
 to be in A-1 condition with all change gears and
 segments.

Wigglesworth Machinery Company
199 Bent St., Cambridge, Mass.
 Boring mill, 72" Niles Bement Pond, 2 heads.
 Drill, No. 3 Avery, power feed.
 Lathe, 32"-64" x11" Fay & Scott, gap. q.c.g.
 Lathe, 36"-48" Bridgeford, geared head.
 Lathe, 48" Putnam standard car wheel.
 Miller, 24" x24" x18" Ingersoll, adj. rail.
 Planer, 48" x48" x22 Detrick & Harvey, o. a.
 Press, No. 178 Toledo toggle drawing.
 Press, No. 18 Bliss cam, double action.
 Press, No. 69 Bliss cam, double action.
 Press, No. 4N Bliss, m. d.
 Screw machine, 34 Gridley, ser. 17439.
 Turret, No. 18 Foster.
 Turret lathe, No. 5A Potter & Johnson.
 Turret, 2 spdl. Jones & Lamson, steel head.

West Penn Machinery Company

Air compressors, 30 to 2500 cubic feet.
 Air compr. portable gas 1-R 180 cu. ft.
 Baling press, 22-P, Logeman, m. d.
 Blower, No. 4 Roots, capacity 2116 c. f. m.
 Bolt cutter, 1" Landis, double head, b. d.
 Bolt cutters, 18" & 24" Acme, b. d.
 Boring mill, 42" Bullard, 2 heads.
 Boring mill, 72" Niles, 2 heads, b. d.
 Boring mill, 10" Niles, 2 heads, b. d.
 Bulldozers, Nos. 2, 4, 6, 9, 28, & 30.
 Brake, 10"-14 ga., D. & K., hand.
 Crusher, jaw, No. 4 Champion, b. d.
 Draw bench, 30,000 lbs. W. F. 22" draw., m. d.
 Die sinker, No. 2 Pratt & Whitney, b. d.
 Drill sharpener, Ing. Rand "Leyner", 18".
 Drill, radial, 21" and 3" Simplex, m. d.
 Drill, radial, 21, Fodick, s. p. d.
 Drill, radial 6 Reed-Prentice, single pulley drive.
 Drills, 4 spindle Avery, No. 2 m. t., s. p. d.
 Drill, No. 310 Baker, b. d., s. p. d.
 Drills, upright 10" to 36".
 Engine, gas, 20 horse power Bessemer.
 Flanger, McCabe, 4" capacity, dies.
 Gear cutters, 11", 18" & 24" Gleason.
 Gear teater, bevel 18" Gleason.
 Grinder, drill, No. 31 Oliver, 14", m. d., 220/3/60.
 Grinder, knife 10' Bridgeport, m. d.
 Grinder, roll, Farrel 30" x16".
 Grinder, surface, No. 1 Diam, 14x24, mag. chuck, m. d.
 Grinders, D. E. 1-2 & 5 h. p., 230/3/60.
 Grinder, disc, No. 8-20 Bessey, belt drive.
 Hammers, 50 lb., 75 lb., 100 lb., 200 lb. Upright.
 Hammers, Nos. 2-B, 3-B, 4-B, 5-B, Nasel.
 Hammers, steam, forging & drop.
 Keyseater, No. 6 & No. 2 Mitts & Merrill, b. d.
 Lathe, bench, 11" x4" South Bend, m. d.
 Lathe, speed, 11" and 13" Blount, m. d.
 Lathe, brass 18x6", friction head, power feed, b. d.
 Lathe, 14" x6" American, t. a. b. d.
 Lathe, 28" x10" Chard, t. a., q. c. g., d. b. g., b. d.
 Lathe, 42" x16" Schumacher Boyce, q. c. g., belt drive.
 Lathe, Lo-Swing, 6"x6", s. p. d.
 Lathes, turret, Nos. 1, 2 and 3 W. & S., b. d.
 Lathe, wheel, 78" x34" Bement, motor drive.
 Lathe, spinning 32" belt drive.
 Locomotive, gas, 6 ton Milwaukee, 36".
 Locomotive, steam, 50 ton Baldwin, std. ga.
 Miller, plain, No. 6 Steptoe, table 30x9, b. d.

FOR SALE BY

The Reeve-Fritts Company
28 N. Clinton St., Chicago

Boring machine, No. 1 Barrett, cylinder.
 Drill, No. 3 Barnes horizontal, double head.
 Grinder, No. 2 Grand Rapids tools & cutter.
 Grinder, Gisholt universal tool.
 Lathe, 18" x8" Chard, q. c. g., taper attach.
 Press, No. 280 Stiles D. A. 73".
 Screw driver, No. 2 Reynolds, auto. feed.
 Screw machine, 3" Cleveland automatic "A".
 Tapper, No. 1 Garvin vertical, #1.
 Turret lathe, 19" P. & W., geared head.

Riverside Machinery Depot

255 St. Aubin Ave., - Detroit, Mich.

AVAILABLE
 Planer, 24" x24" x8" Cincinnati.
 Planer, 30" x30" x18" Gray, 2 heads.
 Drill, No. 14 Natco multiple, 10 spindles, No. 3 taper.
 Drill, Rockford h. d., No. 5 taper.
 Grinder, No. 6 Gardner, m. d., 26" discs.
 Honing machine, Hutto 2-spindle, m. d.
 Over 300 machines available.

1210 House Building,

Pittsburgh, Pa.

Miller, universal, No. 1 Cincinnati, table, 33x6, b. d.
 Miller, vertical, Burke, table, 16x6, b. d.
 Mixers, Sprout-Waldron, batch & liquid.
 Nibbler, No. 1 Campbell 3/16", 6" gap, m. d.
 Pipe shears, 2", 4", 6", 8" & 12" Landis-Oster-Williams.
 Presses, O.H. No. 19 Bliss & No. 4 Niagara, 2" str
 Press, No. 55 Toledo, bed 20x19.
 Press, screw, No. 87 Niagara, hand power.
 Press, arch, No. 30 Bliss, roll feed, b. d.
 Pumps, centrifugal 6" x4" 1", motor drive.
 Punch, E.F. Cleveland, 36" throat, 14" thru 1".
 Punch, multiple, 32E W & W, 10" 2".
 Punch, horiz, No. 7 Kling, m. d., 220/3/60.
 Riveters, air, hammer, spinning.
 Rolling mill, cold 9"x18" motor drive.
 Saws, friction, Nos. 2, 3 & 4 Ryerson motor drive.
 Saw, cold, 48" Newton motor drive.
 Shapers, 16", 20", 21" & 36" Gould & Eberhardt.
 Shears, alligator, 18", 2", 3", 4" & 6".
 Shear, Angle 6x8", Long & Allstatter, m. d.
 Shear, Niagara 42" x14 ga., belt drive.
 Shear, Niagara 42" x10 ga., belt drive.
 Shear, No. 162 Niagara, 62"x18 ga., b. d.
 Shear, Stoll 60" x3/16", motor drive.
 Shear, 8"x14 ga. Ohl, m. d., 110/220/1/60.
 Shear, 10", 18 ga. Niagara, b. d.
 Shear, plate, 48" x8" Ironton, 24" gap, m. d.
 Shear, circle No. 2 Bliss, 40" x20 gauge.
 Shear, guill, No. 2 H. & J. 24" rd. b. d.
 Shear, 10" x4" Bliss, hold down, b. d.
 Shear, plate, 96" x18" Toledo, m. d.
 Slitter, gang, No. 2 W-F. 18", belt drive.
 Slitter, gang, 48" Voder motor drive.
 Slitter, gang, .36" Braddock, belt drive.
 Slotters, 6" & 24" Newton.
 Straightener, 12" x14" Shuster, b. d.
 Straightener, 12" x16" Shuster, b. d.
 Straightener, AS & TP 12"x16", belt drive.
 Straightener, 48" Actea-Standard, 17 rolls 48", m. d.
 Straightener, 60" McKay, 17 rolls 60", m. d.
 Straightener, 60" McKay, 17 rolls 60", m. d.
 Straightener, 84" McKay, 17 rolls 68", m. d.
 Testing machine, 40,000 lb. Riehle, b. d.
 Thread rollers, W-F No. 20-8".
 Tumbling barrel, 34"x18", belt drive.
 Upsetters, 1" to 2".
 Welder, spot, 12 K. V. A.

USED AND REBUILT MACHINERY

WANTED
TAPS-TWIST DRILLS-FILES
CUTTERS-ENDMILLS-SAWS
HACK SAW BLADES

WE WILL BUY YOUR SURPLUS TOOLS

WESTERN TOOL EXCHANGE

18 N. Halsted Street, Chicago, Illinois
 SURPLUS BOUGHT AND SOLD

SPECIAL PRICE ON
VERY LARGE SIZE
B. & S. VERNIER CALIPERS

METRIC MEASURE

Just used on one job. LIKE NEW
 App. 207 C.M.: App. 6½ feet at \$175.00 net
 307 C.M.: App. 11 feet at \$225.00 net

Only One of Each Available in Cases

DeWitt Tool Company
 173 Grand St., New York
 Get on our Mailing List

FOR SALE — GOOD TOOLS

Automatic, B. & S., No. 00, Rol. Brg.	\$1,050.
Automatic, No. 0 B. & S.	\$1,250.
Automatic, Gridley 1½, 4 spindle, No. 5x60, with collets and tools.	\$1,350.
Automatic, Gridley 2½, four spindle No. 6156, with collets and tools.	\$1,500.
Drill, 2 Spd., Cleveland H. S. B. B., No. 2 MT, Tapping Att., on each	\$300.
Grinder, American, Drill, cap. ½ to 2½" with pump	\$75.
Lathe, 15"x6" So. Bend, Q. C. M. D., Rebuilt	
Lathe, 15"x6" LeBlond, Roller Bearing, Q. C. M. D., Taper.	\$700.
Lathe, No. 4 Stark, Bench, ¾",	\$750.
Threader, Namco, 2-sp., ¾" Cap.	\$150.
Miller, No. 2, Craftsman Rotary	\$200.
Scraper, Anderson, Motor Drive	\$750.
Tapper, ¼" Hart-Hageman, Auto.	\$500.
Flame Cut., Hancock, 01, 18x16, Gas.	\$250.

BANSBACH MACHINERY CORP.
 3845 West Madison Street, Chicago
 Kedzie 0212

WANTED

1—11" Goss & De Leeuw Chucking
 Machine with or without threading attachment;
 would consider New Britain or National Acme
 Chucking Machine not under 9" swing; also,
 1A and 2A Warner and Swasey Turret Lathes

Manning, Maxwell & Moore, Inc.
 5 Watson Street, Boston, Mass.

OTT MACHINERY SPECIALS

AUTOMATICS:

Cleveland, model A, 1½, 2, & 2½"
 Cleveland, Model C—1½" Motor Drive.
 Gridley, Model F, 4 spindle, 18, 18, 28.
 National Acme, 3" Model B 4 spindle.
 New Britain No. 34 & 18x7".

DRILLS, Deep Hole Drillers, P. & W. 6 Sp. Vert.

GEAR HOBBERS, Lees-B. Nos. 1, 5A & 5A C.

**GRINDERS, Bryant No. 2 Internal, Motor Dr.
 Heald Nos. 55, 60, 65, 70, and 75.**

Landis, 10x20" Hydraulic, 30" Wheel, M. D.

Hydraulic Vertical Broach, Colonial, 36" Str.,
 54" Daylight, 36"x36" Plate, M.D. like new.

**LATHES, Cisco 14"x5' Q. C.
 Hendey, q. c. 16"x8' & 18"x10'.**

**MILLS, No. C Becker Vert. 30" Rotary Table.
 No. 4 Cincinnati Plain, Cone.
 Pratt & W. 8x14" Thread, M.D.**

**PRESSES, O. B. I. Toledo Nos. 3, 6.
 No. 7½ Blasz, S.S., S.C., S.F. 3" stroke.
 P2 & PG4 Ferrucate Solid Back.**

SHAPERS, 16" and 24" Cincinnati Cone.

OTT MACHINERY SALES, Inc., 548 Second Ave., DETROIT, MICHIGAN

Watch for our

January Issue

CONSIDER GOOD USED EQUIPMENT FIRST

IMMEDIATE AVAILABILITY AND DELIVERY ARE IMPORTANT FACTORS

AIR COMPRESSORS

245 cu. ft. 10"x10" Ingers.-R.
Class ER-1 M.D. 100 lbs Pr.
368 cu. ft. 12"x10" Ingers.-R.
Class ER-1 M.D. 100 lbs Pr.
528 cu. ft. 14"x12" Ingers.-R.
Class ER-1 M.D. 100 lbs Pr.

BALER

Logemann Scrap Baler Model 20-P
Box 26"x12"x11". Bale
11"x4"x4"

BENDING ROLLS

10' Bertsch Initial Type, Motor
Driven Capacity 14" Plate
10' Kling, M.D. Capacity 4"
20' Covington Initial Type, B.
M.D. Capacity 14" Plate

BORING MILLS—VERTICAL

48" Gisholt, M.D. 1 Swivel Hd.
1 Turret Head

72" Gisholt, M.D. Ten Feed
Changes in All Directions

90' Pond, M.D. Two Pl. Swiv.
Heads Q. C. Gear Feeds

BRAKE—LEAF TYPE

6' D&K. "Chicago" No. 167
Motor Driven, Capacity 1"

BRAKES—PRESS TYPE

8' Loy & New. M. D. Cap.
No. 10 Ga.

12' Ohl, B.M.D. Capacity 1"

BULLDOZERS

No. 7 Ajax, M.D. face of cross
head 12"x76" Stroke 16"

No. 7 Williams & White, M.D.
Face of Crosshead 16"x70".
Stroke 22"

No. 29 U Will. & White, Arr.
M.D. Face of Crosshead 34"x
20"x108". Stroke 28"

CRANES—OVERHEAD ELECTRIC TRAVELING

5 ton Bedford 35' 6" Span,
220/3/60 AC

10 ton North 49' Sp. 220VDC
10 ton American 59"x16" Span,
220/3/60 AC

CRANE—GANTTRY

4 ton Link Belt, 100' Span 220
3/60 A.C. With 2 Yd. Wil-

iams Clamp Bucket

DIEING MACHINE

25 ton Henry & Wright
FLANGING MACHINE

4" McCabe Pneumatic Flanging
Machine

FORGING MACHINES

3" to 7" Ajax, Nat. Acme, St. Fr.

FURNACES

9000 lb. Swindell Electric Melting
Furnace Complete with

1800 KVA 22,000/3/60 Trans.

10 ton No. 5 Heroult Slag Melting
Furnace Complete with

7500 KVA 11,000 / 3 / 60
Trans. (New)

3 ton Pittsburgh Elec. Steel
Melt. Furn. Comp. with Trans.

HAMMERS—BOARD DROP

STEAM DROP—STEAM FORG.

1000 lb. to 8000 lb. Chamb., B.

& Sp. Erie, N.B.P Morgan

HAMMER—NAZEL

No. 6B Nazel Hammer, Arr. for
M.D.

No. 3B Nazel Hammer, Arr. M.D.

KEYSEATER

No. 8 Mitta & Merrill, M.D.

Capacity 4" down to 1"

MILLING MACHINE

PLANER TYPE

N.B.P. Adj. Rail 42" bet.
hours. Table 36" wide 8 1/2"
thick 15 1/2" long bet. oil pkts.

PLANERS

100"x4"x25" Pond 4 Hd., B.
M.D.

PLANER—OPEN SIDE

60"x48"x38" Lib. 3 Hd., M.D.

PLANER—PLATE EDGE

10' Southwark, Arr. M.D. Equip.
with Pneu. Jacks. Cap. 1" plt.

PLATE DUPLICATOR

Thomas Plate Duplicator, Table
& Punch, M.D. Cap. Punch

1 1/4" thru 1", 73" Wide x 20'
Long

Thomas Plate Duplicator, Table
& Punch, M.D. Cap. Punch
1 1/4" thru 1", 73" Wide x 13'
Long

PRESS—CORROUGATING

12' Streine Dbl. Act. Toggle, P.
M.D. Cap. No. 10 Gauge

PRESSES—HYDRAULIC

300 ton Chambers. Self-Cont. 4
Col. Hydro-Pneu. P. 12" Dia.
of Ram, 18" Str., 49" Bet.C.

250 ton Birdsboro, 18" Str. of
Blankholder, 36" Str. of Slide,
Are Blankholder 42x2"

500 ton United High Speed
Forging Press Four Col. Type

760 ton Southwark, 41" x 19"
Between Columns

PRESS—STRAIGHT SIDE

No. 96F Toledo Double Crank,
12" Str. 124" Bet. Uprights

PUNCH—BEAM

Kling Beam Punch & Cop. Mch.
Arr. for M.D. Cap. to cope or
notch 6" to 24" I-beams, Equ.
to punch 6 1/2" holes in 1/2"
plate; shr. 8" chan. or I-beams

PUNCHES—MULTIPLE

Hilles & J. No. 7, 98" Betw.
Hous., 15" Thr., M.D. Cap. to
punch 40 13/16" holes thru
1/2" plate. Equipment Thomas
Spac. Table 22 1/2" long

PUNCH & SHEAR COMBINATIONS

No. 6 Beatty Dble. End, M.D.
16" Thr. Cap. Punch 1" thru 1"

Hil. & J. Punch, Sgl. End, M.D.
Thr. 60" Cap. Punch 2" thru
1 1/2" with Lysholm Table

Type G Clev. Sgle. End, Arr.

for M.D. 12" Throat. Cap.

Punch 2" thru 1".

Lysholm Double End, M.D. 44"

Turta. Cap. 1 1/4" thru 1 1/2" Stee

ROLL—CORRUG. CURVING

10' Bertsch Initial Type, B.D.
Cap. 3/16". 2.66" Corrug

ROLL—PLATE STRAIGHTEN

96" Newbold, Arr. for M.D.

Nine 14" Dia. Rolls. Ca-

pacity 14" Plate

72" Hilles & Jones, M.D. Ca-

pacity 14" Plate

ROLLING MILLS

9" Belgian Bar Mill. Consisting
of two 3' high roughing stands
12" x 54" finishing stand 2

stands 3 high 9" x 13",

stands 3 high 9" x 30"

10x9" Acme Four Stand 2 High

10 1/2" x 12" UE&F Sgl. St. 2 Hi.

14x42" Gar. Sgl. Stand 2 Hi.

22x28" Univ. High Mill com-

plete install. incl. motor

19" Morgan 8 Stand Contin.

Sheet Bar and Skelp Mill with

3 Stands of Vertical Rolls

24" Mackintosh Merch. Bar Mill.

One 3' High Stands. One 2'

High Bull Head Stand

30" Morgan 5' High Mill.

44" Bloom. Mill. Consist Pin-

ion Stand, Rol. Tbl. & CatchT.

SHEAR—ALLIGATOR

No. 5 Birdsboro High Knife,
M.D. Capacity 5" Square

SHEARS—BAR

Mesta Guillotine Type Steel

Frame Arr. M.D. Cap. 6" Sq.

No. 8 Beatty, M.D. Cap. 4" x 30"

Cold. Complete with run-out

Table 190' long

SHEAR—GATE

132" Morgan. 7 1/2" Stroke. Ca-

pacity 1 1/4" Plate

No. 6 Hilles & Jones, Arr. M.D.

Cap. 9 1/2" x 1" Plate

No. 7 Hilles & Jones, Arr. M.D.

Cap. 12" x 1"

SHEAR—ROTARY

No. 40A Quickwork, Arr. M.D.

Capacity 1" Circle Cutting At-

achment

STRAIGHTENERS

No. 0 Medart, Arr. M.D. Tim-

ken Equipped. Capacity 4"

to 1 1/2" dia.

1/2" Halsted Straightening & Cut-

off Machine Arr. M.D. 12"

Cut-off

3/16", 1", 1 1/2", 1 1/4" Shuster

Straightening & Cut-off Ma-

chines. Belt Drive

United E&FCO Gag Press, M.D.

Capacity 1 1/2" to 5" Tubing

**Entire Surplus Manufacturing Equipment Inventories Purchased.
Appraisals. Liquidations. Consulting Engineering Service.**

RITTERBUSH & COMPANY, INC.

NEW YORK

30 CHURCH ST.

PH. CORTLAND 7-3437-3438

CABLE ADDRESS: RITTERBUSH, NEW YORK

LATHES

30"x16' New Haven Q.C.
24"x12' Boye & Em. Q.C.
21"x10' LeBlond.
20"x10' Boye & Emmes Q.C.
18"x12' Hendey, Q.C.
18"x8' Rahn Larmon Q.C.
16"x8' Lodge & S., Q.C.
14"x8' Lodge & S. Q.C.

McBRIDE & McCLENNEN*Trading As***DELTA EQUIPMENT CO.**148 N. Third St.,
Philadelphia, Pa.**DRILL, RADIAL**

3' Fosdick.

MILLING MACHINES

No. 1½ Becker Universal.
No. 2 B. & S. Plain.

PIPE MACHINES

6' Oster.

12' Curtis & Curtis.

PLANERS

26"x26"x8' Fitchburg.

30"x30"x10' Pond.

SHAPERS

20' Stockbridge.

20' Steptoe.

24' Stockbridge.

Since 1919

AUTOMATICS

Cleveland 1½" Model "A"
Gridley 2" 4-spindle. Model "F"
Brown & Sharpe No. 00

DRILLS & RADIALS

Cincinnati-Bickford 4'
Fosdick 3' and 2½'
Niles 6' Universal
Silver 3½' Plain
Carlton 3' Sensitive
Avey: L&G; Demco; H&W Ed-
lund 1, 2, 3, 4 spindles

**HENDAY TOOL ROOM
LATHES**

12x5; 12x6; 14x6, Geared 14
x6 Tie Bar; 14x6 Tie Bar
and Taper; 14x10 Grd.; 16
x6 Tie Bar; 16x6 Tie bar
and Taper

LATHES

Warner & Swasey No. 2A Tur-
ret, Bar Mach.
Boye & Emmes 32x14 Cone,
Q.C.G.; T.A.
LeBlond 14x8; 14x6; 19x8
American 20x8 Grd. Hd.; 18
x8 Cone
Lodge & Shipley 14x6; 16x6;
24x16'
Monarch 14x6; 16x6
Rockford 14x6

**HYDRAULIC
WHEEL PRESS**

350-ton cap.; 54" between
rods; 17" distance ram to
resistance

SHEARS

No. 236 Nia. 36x14 ga. (4)
No. 16A Nia. Ring & Circle
No. 136 Stoll 36x16 ga. cap.
No. 142 Stoll Sq. 42"x16 ga.
No. 748 Niagara Grd. Over-
dr.; M.D. 48"x3/16" cap.

STEEL POWER BRAKE

D&K Apron Bending Brake;
M.D. 6"x4" capacity

GRINDERS

12" Heald Rotary
14x50 Norton Plain
6x20 Landis Universal
Nos. 2 & 24 Bath Universal
3" Abrasive Surface
12x36 P&W Vertical
No. 3 Landis Universal 12x36"

MILLERS

Brown & Sharpe No. 1½ Plain
Cincinnati Nos. 4, 3, 1½
Kempsmith No. 3, 2 and 1
Ohio No. 3; No. 2 Universal
Garvin No. 2A Universal
Rockford No. 2 Universal
Brown & Sharpe No. 13-B

**GOULD & EBERHARDT
SHAPER**

34" stroke
Motor Driven

MISCELLANEOUS

Abrasive No. 3 Surface Grinder
Norton 14x50 Grinder
Pease 36" Blue Grinder
Nilson 4-spindle Wire Former
Electric Lift Truck 4000 lbs.
Furnell Rolling Mill 22"x12"
Miner 400 lbs. Drp Hammer
Leveller Rolls 60"x10 ga.

LODGE & SHIPLEY LATHE

16"x6'
Geared Head; Motor Drive;
Complete and in Perfect Cond.

**AUTOMATIC
PIN GRINDER**

Arter No. 132—Self contained

PRESSES

Bliss No. 18; 19; 19C; 20;
21; 21½ OBI
V&O No. 1; 3½; 3; 3½ OBI
Baxendale No. 4 OBI (15)
Niagara No. 3; No. 4
Toledo No. 75; No. 14
Toledo 250-ton Coining Press
Toledo 100-ton Coining Press
V&O No 12½ Dble. Acting Dial
Feed
Bliss No. 37½ S.S. Geared

NO. 1 BLISS TOGGLE PRESS

Bed area 18x16; 7" stroke
Geared; will draw and lift
out 34" Weight 6000 lbs.
Bliss No. 3015 Auto. Gang
Press

Acme 42" Power Paper Cutter
W&W 10" Multiple Punch
Bliss No. 4 Dble. Crank Press
Bliss No. 305 S.S. Tie rod
Grd. 5" str.
Bliss No. 702 Flat Edge Trimming
Perkins No. 50 Dble. Crank
Stoll No. 70B and No. 158B
Dble. Crank
Billings & Spencer No. 2
Trimming

MULTIPLE PUNCH

Williams & White 10" bed;
7" shaft; 2½" stroke; 17½
ton. Wt. 38,000 lbs.; M.D.

BORING MILL

54" Colburn; Vertical Boring
& turning Mill; Arranged for
M.D.

WARNER & SWASEY No. 4
Universal Turret Lathe; Bar
Feed; 6-speed Geared Hd.;
Single Pulley Drive

FALK MILL SUPPLY CO., Inc., 18 Ward St., Rochester, N. Y.

Good Used Machinery

ARC WELDER—G. E. 200 amp., m.d.

BORING MILLS—Niles 36" c. d. Brush 44" m.d. Bullard 51" Vert., 2 hds., Bullard 42" Mill, vert.; Rockf. No. 2 horiz., 3½" Bar; Colburn 42" Vert. 2 Hds.

BRAKES—D. & K., 5' Box & Pan, 14 ga. Keene 10' 16 ga. Toggle Press.

DRILLS (RADIAL)—Mueller 2½", Fosdick 2½", Fosdick 4", Carlton 4" all gear box dr.; Hammond 4" sensitive; Mueller 4½" g. box; Bickford 4" Gr. Box.

DRILLS (H. S. B. B.)—H & W 2, 4, 5-sp.; Allen 2 & 6-sp.; Avey, Demco, Lel-Giff. 1-sp.; Sipp 2 & 3-S.P.; Avey 2-sp.; Avey-matic 2-sp., m.d.

DRILLS (MISC.)—Baker No. 217 (2) Hvy. Duty; Hamilton 42" S. H.; Barnes 20" & 24" 1-sp. & 20" 4-sp. & 24" 3-sp. all grd. camel back; P & W No. 12 Multi-Sp.; Nato 20 sp. Rect. head.

GEAR CUTTER—G & E 60" & B & S 28" s. p. d. automatic spur; Cincinnati 36" gear cutter. G. & E. 48" gear Cutter.

GRINDERS—P & W 12" vert. surf.; Cin. No. 1½ & B & S No. 12 univ. tool, B & S Nos. 11&16 pl. Heald Nos. 60665 Int.; Landis 10x30" Plain; B & S 10x48"; 3—Norton 6x32" plain, Heald No. 20 Rotary Surface (3); Badger No. 220, auto. d. e., opposed disc (4); Norton 10" x 36"; Diamond No. 2 Auto. Surf. Ott 5x18" Pl.

HAMMERS—Mayer 50-lb.; W & W 165 lb.; Beaudry 400 lb.; High Speed Rivet No. 3-A.

KEYSEATERS—Mitts & Merrill No. 5 vert. Davis No. 1; M. & M. No. 0.

LATHES—Monarch 16"x10" M.D.; LeBlond 18x8"; Lehmann 18"x9"; Amer. 22x8"; Davis 22"x10"; L & S 20"x10"; S-B & E 20"x10" q. c. q. Flather 22"x10"; LeBlond 16"x8"; Gleason 45"x12"; Monarch 16" x 8" (2); Ryerson 20x10", m.d.; Mueller 22"x12"; S.B.E. 30"x12" Q.C.G.

MILLING MACHINES—B & S No. 1, Cin. No. 1½, Ohio No. 29, Kemp. No. 3 & Brown & Sharpe No. 3 Universal; Ohio

No. 20, American No. 1½, Cin. No. 3, Hendey No. 3, B & S No. 3, LeBlond No. 3H, LeBlond No. 4 M.D. C.D. & Cleveland No. 2 S.P.D. Plain, Cin. 24" Auto. Plain; Becker No. 6 and Model "B" Vertical; Owen Duplex; Ingersoll M.D. Slab Miller 4 hds.; Becker No. 5-B Vertical; Cin. Auto. Plain.

PLANERS—Gray 48" x 48" x 10"; Gray 28"x28"x6" 1-hd.; Pond 32"x34"x10"; Sellers 36x36x12"; Pease 26"x26x9".

PUNCH PRESSES—Federal Nos. 1, 2, 3 o.b.i.; Bliss No. 18 & 19; Ferracutte No. P-4; Fer. No. EGF 52 Coining; Willard No. 4A o.b.i.; Swaine No. 38 arch, Swaine No. 37 O.B.I.; Rockford Nos. 2 & 3; and Verson No. 4 O.B.I.; Bliss No. 19½; Michigan No. 4 O.B.I.; Niag. No. 4, Niag. No. 5, L & J No. 3, Walsh No. 1, O.B.I. Bliss No. 68-N; Cons. No. 24 Blanking.

SAWS (HACK)—Rac. 6x6" h.s.; Rac. 8x8"; Peerless 6x6" H.S. (4); Atkins 6x6".

SAWS (COLD)—Cochrane & Bly Nos. 2-B & 4-B; Peerless 6x6 Univ. Shaping.

SHAPERS—S & M, G & E, Ohio, Mi., Q. City, Davis, Cin. 16"; Ohio & G & E 20"; S & M, Q. City, Rock, Cin. 24"; Ohio 26"; Cin. 24" s. p. gr. box; American 24" heavy, b.g. Amer. 15"; Springfield, 15"; S.M. 26", b.g. G. & E. 24", s.p., gearbox; Amer. 20"; Rhodes 7"

SCREW MACHINES—W.S. Nos. 6, & 8 Hand; Nat. Acme, Nos. 515, 4-sp.; Gridley 4-sp. 7/8"; Automatic, Gridley 4 spindle, 2½"; B.S. No. 4 Hand; Nat. Acme No. 52.

SLOTTER—Bement-Miles 10" vert.; Barr 12".

SQUARE SHEARS—Ohl 10" 10 ga.; Bertsch 60" 16-ga. grip.

TAPPING MACHINES—(2) Garvin No. 2 & 2X Vertical Automatic & Garvin No. 1.

TURRET LATHES—Bullard 36" vertical, rapid production. Baush 30" M.D.; Bullard 24" vert. rap. prod.; W.S. No. 8; Potter & Johnston.

Above is only a small part of our large stock on hand

McDonald

MACHINERY CO.
1531-35 N. Broadway ST. LOUIS, MO.

AUTOMATICS

$1\frac{1}{2}$ " Model B. Cleveland
 $\frac{7}{8}$ " Model G. Gridley
 $\frac{7}{8}$ " Model M. 4SP Clevelands (6)

BORING MILLS

$3\frac{1}{4}$ " Binsee Hor., Knee Type
 10 Ft. Pond, Vert.

LATHES

14"x6' Rockford, Prod., Q.C.G.

TRIPLEX MACHINE CO., ¹¹⁷ FOURTH STREET
 PITTSFIELD, MASS.

MILLERS

No. 12 B. & S. Pl., Cone Dr.
 No. 2A Garvin Univ., All Att.,
 Cone Dr.

SHAPERS

20" Stockbridge, Vise, Cone Dr.

TURRET LATHES

$2\frac{1}{4}$ " J. & L. (2) $1\frac{1}{4}$ " W. & S.
 $\frac{5}{8}$ " P. & W. 6A, P. & J. S., S.P.D.(3)

More FOR YOUR MONEY

AUTOMATICS

No. 55 National Acme, 4 spdl.

DRILLS

4 Spdl. Leland & Gifford, Power feed
 Davenport double head, 10 spdl.
 Kingsbury, single spdl.
 No. 2 Colburn Mfg. Drills (4) heavy
 duty, No. 4 Morse taper

GRINDERS

No. 1 Morse Universal
 No. 34 Van Norman
 No. 1 Steel Products Gage Grinder (3)
 Pratt & Whitney
 Besely 2 spdl. opposed disk

MILLS

Bilton No. 50 Productomatic
 Bilton No. 8 Productomatic
 No. 2 Toledo Semi-Automatic
 No. 15 G Bilton Auto. Gear Miller

PLANERS

42x42x12 Detrick & Harvey

PRESSES

No. 74 $\frac{1}{2}$ Bliss Trimming Flywheel Type
 Jarecki Die Try-out Screw Press
 No. 6 Farrel
 25 Ton H & W
 96 $\frac{1}{2}$ Bliss S.S. Dbl. Crank

SHAPERS

16" Gould & Eberhardt, high clutch
 type
 20" Gould & Eberhardt, cone drive

SHEARS

No. 2 Ryerson-Lennox Throatless Bevel
 Buffalo Armor Plate Bar Cutter
 Pettingell No. 14 Sheet Metal Rotary

MISCELLANEOUS

No. 1 U Bethel Player Lapper
 Norton Lapper
 Kent Auto Hopper Feed $\frac{1}{2}$ " Stud
 Threader
 Quickwork 36" Sheet Mtl. Dbl. Bumping
 Hammer
 No. 1 Garvin Tapper
 Davis Keyseater
 20 ton Hanna Yoke Type Riveter
 2 spdl. Hutto Honing Machine
 2 spdl. Lipe Gear Chamfering Machine
 Magnetic Chip Separator
 Magnetic Chuck
 No. 3 Manville Header, sgl. stroke, solid
 die

LATHES

18x4 American Back Geared
 $3\frac{1}{4}$ "x36" No. 3 Cincinnati Acme Turret,
 Full Universal
 21x10 Leblond

LAFAYETTE MACHINERY CORPORATION

6320 East Lafayette Ave.,

Detroit, Michigan

REBUILT & GUARANTEED MACHINES

BORING MILLS—horizontal:

5" bar Niles, Knee type, Circ. Table
3" bar Lucas, Table type, & Aux.Tb.

BORING MILLS—vertical:

72" NBP, Heavy Duty, P.R.T., M.D.
53" NBP, Heavy Duty, M.D.
42" NBP Standard, M.D.
42" Colburn Heavy Duty, M.D.
42" Bullard P.R.T., M.D.
36" Bullard Rap. Prod., Side H.
24" Bullard Rap. Prod., Side H.

ENGINE LATHES:

48"x36' Fifield, Triple Geared
42"x30' Johnson, Geared Head
36"x14' NBP Heavy Duty, M.D.
36"x22' Bridgeford, H.D., M.D.
28"x15' Lodge & Shipley, M.D.
27"x14' Lodge & Shipley, M.D.
20"x14' Cisco, Geared Head
20"x14' Walcott, Geared Head
20"x12' Lodge & Shipley, M.D.
20"x10' LeBlond, Geared Head
20"x10' American, Geared Head
18"x 8' American, Geared Head
16"x14' Lodge & Shipley, M.D.
14"x10' Hendey, Geared Head
14"x 6' Prentice, Geared Head
10"x 5' P. & W. Prod. Lathes

GEAR CUTTERS:

60" Gould & Eberhart, M.D.
72" Gould & Eberhart, M.D.
No. 12 Barber-Colman Hobbers
No. 62 Fellows Gear Shapers
24" Gleason Gear Planer

MILLERS:

No. 2A Brown & Sharpe, Universal
No. 2 Garvin, Universal
No. 3 Owen, Universal
No. 3 LeBlond, Universal
No. 2 Van Norman, Duplex
No. 4 Hendey, Plain
No. 1½B Brown & Sharpe, Plain
No. 1B Brown & Sharpe, Plain
No. AB Becker Vertical, M.D.
No. 5 Brown & Sharpe, Vertical
18" Cincinnati, Automatic
28" Cincinnati, Semi-Automatic
18" Cincinnati, Duplex
60" Garvin Automatic Duplex
No. 3 P. & J. Automatic Vertical

PLANERS:

72"x72"x12' Putnam, Hvy. Duty, (2)
54"x54"x16' New Haven, H. Duty
47"x40"x12' Gray, Heavy Duty
36"x36"x12' Bickett, Heavy Duty
30"x30"x12' Whitcomb, H. Duty

RADIAL DRILLS:

3'6" American Plain, M.D. thru G.B.
6' Cincinnati-Bickford, M. on Arm

MISCELLANEOUS:

24" Gould & Eberhart Shaper
16" Gould & Eberhart Shapers
No. 3 B. & O. Turret Lathe
8" Stoever Pipe Threader
No. 2 Lapointe Dbl. Spindle Broach
500 ton NBP dbl. Carwheel Press
2" Gridley type "G" 4 Spin. Aut.

Special: 1000 ton Allsteel FORGING Press

Performance and accuracy of our rebuilt machines unconditionally guaranteed.

ATLANTIC MACHINERY CORPORATION

148 Broadway, New York City

Telephone: WOrth 2-8662

Cable: Atmacor

EMCO REBUILT

PLAIN CYLINDRICAL GRINDERS

- 6x18" Landis, m.d.
- 6x32" Norton, m.d.
- 10x18" No. 14 Brown & Sharpe, belt
- 10x36" Landis Integral Cam, m.d.
- 10x36" Norton, belt
- 10x36" Norton, m.d.
- 10x50" Norton, belt
- 10x52" Landis, m.d.
- 10x72" Landis, m.d.
- 12x18" Cincinnati Plunge Cut, m.d.
- 12x36" Cincinnati, belt
- 12x36" Modern, m.d.
- 12x42" Landis, belt
- 12x48" Modern, m.d.
- 12x72" Landis, m.d.
- 14x72" Norton, m.d.
- 16x48" Cincinnati, belt
- 16x52" Landis, m.d.
- 16x72" Landis, m.d.
- 16x72" Landis, m.d.
- 20x144" Landis, m.d.

DISC GRINDERS

- No. 1, 4, 6 Gardner, m.d.
- No. 6 Diamond, belt
- No. 20 Gardner Combination, m.d.
- No. 51 Besley, m.d.
- No. 120 Gardner Plain, belt
- No. 120 Gardner Combination, belt

INTERNAL GRINDERS

- No. 6, 10 Bryant Semi-Automatic Hole
- No. 11 Giddings & Lewis Teromatic, 3 m.d.
- No. 70 Heald, belt
- No. 103 Rivett, belt

SURFACE GRINDERS

- No. 25A Heald Rotary, 16" mag. chuck
- No. 33 Abrasive Vert. Surface, m.d.
- 18"x48" Diamond L.D. Face, m.d.
- 30x84" Diamond H.D. Face, m.d.
- 54" Bridgeport Knife, belt
- 60" Bridgeport Face, belt
- Springfield Planer Type, m.d.
- 6 Reed-Prentice Vert. Surface, m.d.

TOOL & CUTTER GRINDERS

- No. 1, 1½ Cincinnati, belt
- No. 1 LeBlond Universal, m.d.
- No. 1 LeBlond Universal, m.d.
- No. 1 Wilmarth & Morman Universal, m.d.
- No. 3 Gallmeyer & Livingston Univ., m.d.
- No. 4, 5, 41 Oliver M.D. Drill Pointers

MILLING MACHINES

- No. 56-108 Cincinnati Plain Hydromatic, m.d., 3 vertical spindles, like new
- No. 33 Kempsmith Mfg., s.p.d.
- C66A Newton 3 spindle Continuous, s.p.d., 48" dia. table
- 48" Cincinnati Worm Driven Plain, Automatic, m.d., widened pattern
- 48" Oesterlein Tilted Offset, m.d., National Standard Spindle, Timken Bearings.

- No. 3, 4 Cincinnati Plain, cone
- No. 3 Kempsmith Plain, cone
- No. 25 Ohio Plain, cone
- No. 13B Brown & Sharpe Plain, s.p.d.
- No. 15 Garvin Plain, cone
- No. 25 Becker Plain, cone
- No. 3 Ohio Universal, cone
- No. 2A, 6 Becker Vertical, cone
- No. 22 Garvin Vertical, s.p.d.
- No. 6 Whitney Hand

PLANERS

- 24" Cincinnati Crank, m.d.
- 30"x30"x8" G. A. Gray, 1 head
- 30"x30"x8" Pond, 1 head
- 30"x30"x10" American, 1 head
- 30"x30"x10" Cincinnati, 2 heads
- 32"x32"x8" Gray, 1 head
- 34"x24"x8" Cincinnati, 1 head
- 36"x36"x10" Cincinnati, 3 heads
- 36"x36"x10" Whitcomb-Blaishell, 2 heads
- 54"x42"x12" Gray, 4 heads, reversing m.d.

PRESSES

- McDonald Single Crank
- Waterbury-Farrel Single Crank
- No. 1½ Bliss Cam, geared
- No. 2S Consolidated O.B.I.
- P2 Ferracute Stiles Type
- D2, DD2 Ferracute Drawing
- No. 5 Bliss Stiles Type
- No. 6 Waterbury-Farrel D.C.
- No. 15 Bliss Horning
- No. 25A Bliss
- No. 50-436 Minster Straight Side
- SS1 Ferracute D.C.
- DGS3 Ferracute Redrawing
- No. 54A Toledo Special
- No. 92B Toledo D.C.
- No. 93A Toledo S.S.
- No. 94 Bliss Consolidated
- No. 268/40 Toledo D.C. Toggle Drawing, weight 175,000 lbs.
- No. 496D Tol. D.C. Tog. Draw., 160,000 lbs.

TURRET LATHES AND SCREW MACHINES

- No. 1, 2, 8 Warner & Swasey, cone
- No. 2 Pratt & Whitney Turret, cone
- No. 3 Foster, cone
- 1½x18" Pratt & Whitney, cone
- 2x24" Jones & Lamson Geared Head
- 2x26" Pratt & Whitney, cone
- 2½x26" Modern, cone
- 2 spindle Jones & Lamson Steel Head
- 2 spindle 3x36" Jones & Lamson Grd. Hd.
- 3x36" Jones & Lamson Geared Head
- 3x36" Pratt & Whitney, cone
- 18" 20" Acme, cone
- 18" Libby Type A
- 21", 24" Gisholt

BORING MILLS

- 30" Gisholt, cone
- 42" Gisholt, gear box

PARTIAL LISTING ONLY

THE EASTERN

1001 TENNESSEE AVENUE,

MACHINE TOOLS

48" Niles Car Wheel Borer
 52" Bausch, m.d.
 84" Niles, cone
 No. 4 Niles-B.-P. Horiz., 5½", bar, m. d.
 Niles-Bement-Pond Cyl. Bor., m.d., 12" m.b.

SHAPERS

10" Alba, gear box, new
 16" Cincinnati, cone
 16" Davis, gear box
 20" Hendy, cone
 20" Queen City, cone
 24" Barker, cone
 24" Cincinnati, cone

ROLLS

24" Niles Bending Rolls, strong back pyramid type, cap. 1" plate, wt. 154,000 lbs.

SAWS

No. 2B Cochran-Bly Cold Saw
 No. 20C Racine Shear Cut Hack Saw
 9x5" Peerless Hack Saw
 13"x16" Peerless Hack Saw
 6" Avey Milband Cutting-off Machine
 No. 15 Lee Simplex Cold Saw
 10x10" Kelly Hack Saws, new

GEARED HEAD ENGINE LATHES

14"x6" Prentice
 16"x8" American, taper
 16"x12" American, taper
 16"x14" American, taper
 16"x8" Reed
 16"x8" Lodge & Shipley
 18"x10" American, taper
 18"x12" American, taper
 18"x15" Lehmann, taper
 16"x8" Lehmann
 20"x8" Greaves-Klusman, taper
 20"x10" American Taper
 20"x14" Hendey, taper
 21"x16" LeBlond, taper
 24"x12" American, taper
 24"x26" American, taper
 24"x18" Lodge & Shipley, Pat. Head, taper
 26"x16" Bradford, taper
 26"x18" Bridgeford
 26"x18" Bridgeford Oil County Type, 10" hole in spindle, taper
 27"x16" Lodge & Shipley, taper
 36" raised to swing 65"x20" American, internal geared face plate

CONE HEAD ENGINE LATHES

14"x6" Hendey, taper
 14"x8" American
 15"x8" LeBlond
 15"x8" Sidney
 16"x6" Greaves-Klusman
 16"x6" LeBlond, taper
 16"x7" Pratt & Whitney, taper, col. attach.
 16"x8" American
 16"x14" American
 16"x8" Cincinnati

16"x8" Monarch
 16"x8" South Bend
 18"x8" Monarch
 18"x8" Hendey Yoke Head, taper
 18"x8" LeBlond
 18"x8" Mueller, taper
 18"x10" Schumacher-Boye, taper
 20"x8" American
 20"x10" Davis
 20"x10" Lodge & Shipley
 21"x8" LeBlond, taper
 21"x10" LeBlond
 24"x10" Bridgeford
 24"x10" Canada
 24"x11" Chard
 24-48"x16" McCabe Two in One
 24"x16" Schumacher-Boye
 26"x12" Boye & Emmes
 27"x16" Bridgeford
 28"x14" LeBlond
 42"x24" Springfield
 42" raised to 53"x39" Putnam

RADIAL DRILLS

2½" Cincinnati Bickford, gear box
 2½" Fosdick, gear box
 2½" Avey Sensitive, belt
 3' American Sensitive, belt
 3' Carlton Sensitive
 3½" Fosdick, gear box
 4" Dresses, gear box
 4" Hammond Jack Knife
 4', 5', 6' N-B-P Semi-Univ., var. spd.m.d.
 4', 5', 6' N-B-P Semi-Univ., gr. box drive
 4" Ryerson, gear box
 5" American Triple Geared, gear box
 5" Cincinnati Bickford, gear box
 5" Dresses, gear box
 5" Prentice, cone
 7" Fosdick, cone

GEAR CUTTERS & HOBBERS

6" Gleason Straight Bevel
 No. 1 Lees-Bradner, m.d., cap. 10"
 No. 3 Heavy Brown & Sharpe, s.p.d.
 No. 3-26" and 3-36" Brown & Sharpe
 No. 3-26" Cincinnati
 No. 5A-14" Lees-Bradner
 No. 6-60" and 6-72" Brown & Sharpe, m.d.
 No. 7 Fellows H.S.
 No. 12 Barber-Colman
 No. 16HW Gould & Eberhardt, s.p.d.
 18" Cincinnati Gear Hobber, m.d.
 36" Gould & Eberhardt Gear Cutter
 Peerless Gear Tooth Rounder
 Rochester Gear Tooth Rounder
 Gleason Bevel Gear Tester
 Schuchardt & Schutte Gear Tooth Rounder

HAMMERS

4000 lb. N-B-P Double Frame Steam, new
 4-350 lb. N-B-P Single Frame Steam, new
 1500 lb. N-B-P Single Frame Steam

END US YOUR INQUIRIES.

**MACHINERY CO.,
 CINCINNATI, OHIO**

BLUE BOOK BUYERS' SERVICE

Available To Our Readers

If you will list below the metal-working machines or machine shop equipment in which you are interested and mail to us, we shall be glad to refer your needs to the manufacturers or companies in position to serve you. Replies will come from them—not from us.

If you have any special engineering or shop problem with which you are experiencing difficulty, suggest that you send us full details for reference to our Engineering Service Department.

We are in the market for

Name _____

Address

Please check—

- Interested in new equipment.
 - Interested only in used equipment.

Mail to the
HITCHCOCK PUBLISHING CO.
508 South Dearborn Street, Chicago, Ill.

NORTON MOTOR DRIVEN GRINDERS

6"x18"	10"x50"	16"x50"
6"x32"	10"x72"	16"x72"
10"x18"	10"-15"	18"x96"
10"x24"	gapx72"	18"-24"
10"-15"	14"x36"	gapx96"
gapx24"	14"x50"	21"x96"
10"x36"	14"x72"	23"x120"

BORING MACHINES

No. 3-A Universal, 3" Bar.
No. 2 Barrett, 5" bar, extension bed.

BORING MILLS

36" King
42" Gisholt
48" Gisholt.
52" Gisholt.
54" Colburn.
60" Gisholt, M.D.
72" Bickford.
72" King, motor drive.
72" Niles, Bement, Pond, M.D.
10' Niles.

DRILLS

1, 2, 4, 6 Spdl. Leland-Gifford.
1, 2, 4 Spdl. Henry & Wright.
No. 25-24" Foote-Burt.
No. 2 Colburn, 3 & 4 Spindle.
No. 4-5 spdl. Foote-Burt.
No. 1, No. 3, No. 4 Baush Multiple.
3' Western Plain.
4' American Plain.
4' Western, motor on column.
6' American Plain
6' Fosdick Plain
6' Western Plain.
7' American Full Universal.
7' & 8' Western heavy.

GEAR CUTTERS

No. 2, 3, 12 Barber-Colman.
No. 1/2, No. 1 Pfauffer Hobber.
No. 2 Pfauffer Hobber.
No. 3, 4, 5, 6 Brown & Sharpe.
No. 624 Fellows
No. 6-A-72" Cincinnati.
No. 16-HS G. & E. Hobber.
No. 24-HS G. & E. Hobber.
18" Gleason Bevel Generator, m.d.

GRINDERS

No. 2 Thompson Univ.
No. 2 1/2 Universal (Bath type).
No. 4-12"x66" Landis Universal.
No. 70 Head Internal.
No. 16-26" Blanchard Vert. Surface, M.D.
No. 22-12" Head Rotary Surface.
No. 25-16" Head Rotary Surface.
14"x96" Norton Face.

LATHES

16"x8" Flather.
18"x8" Lodge & Shipley.
18"x12" American.
20"x10" Lodge & Shipley.

LATHES—Continued

20"x12" Lodge & Shipley.
24"x12" American.
24"x13" Chard.
24"x16" Lodge & Shipley.
24"x18" American.
24"x20" Lodge & Shipley, Taper.
24"x22" Lodge & Shipley, Taper.
25"x10" LeBlond Heavy Duty.
27"x18" Sidney, Taper.
30"x12" Whitcomb-Blaisdell.
30"x12" Lodge & Shipley, taper att.
36"x16" Bradford, taper att.
46"x30" Houston, Stanwood & Gamble, m.d.
60" New Haven turning & boring.
20"-40"x10" Rahn - Larmon Geared Head Sliding Bed Gap.

MILLERS

No. 2 Cincinnati Universal.
No. 5 Brown & Sharpe Vertical.
No. 5-B Becker Vertical.
No. 6 Becker Vertical.
ACS Becker Continuous Vert.
No. 4 Hendey Lincoln.
Type "B" Briggs Lincoln.
No. 12 P. & W. Lincoln.
No. 33 Becker Brainard.
24"x24"x12" Ingersoll Adj. Rail.
36"x36"x12" Newton Duplex.
36"x44"x20" Ingersoll Slab.
72"x16"x14" Ingersoll Slab.
No. 1 Smalley-General Thread Miller.

PLANERS

24"x24"x8" Cincinnati.
24"x24"x8" Rockford.
24"x24"x12" Gray.
30"x30"x8" American.
30"x30"x18" Cincinnati.
36"x36"x8" 18" Cincinnati.
36"x36"x16" Niles-Bement-Pond.
42"x42"x14" Gray.
48"x48"x10" N-B-P.
60"x48"x20" Hamilton.
72"x60"x16" American.

PRESSES

No. 01 & No. 1 V.S.O., M.D.
No. 1 1/2 V.S.O., M.D.
No. 20 Bliss, M.D.
No. CG-24 Ferracute, Geared, M.D.
No. 5 V.S.O., grd., M.D.
No. 303 Bliss S.S., Geared.

TURRET LATHES

No. 6-2" Wood A.C. & B.F.
No. 4 Milholland G.H.A.C.&B.F.
No. 6-21/4" Warner & Swasey.
18" Libby-International, 5" H.S., M.D.
No. 3A Warner & Swasey.
2 1/4"x25" Greenlee, A. C. & B. F.
3 1/4"x40" Greenlee, A. C. & B. F.
24" Gisholt, 6 1/4" H.S.
26" Libby, 7 1/2" H. S., M.D.
34" Gisholt, motor drive.

HILL-CLARKE MACHINERY CO.
645 W. WASHINGTON BOULEVARD, CHICAGO

IF WHAT YOU WANT ISN'T HERE Send Us Your Inquiry

BRAKES:

No. 183 Chicago 6 ft. 12-ga., pwr.

DRILLS:

Radial, sensitive, 3¹/₂ American.

Radial, 3 ft. Fosdick.

Nateco Type K 20-spdl.

Rad. Foote-Burt Nos. 2 & 4, 4 spdl.

Prentice, 4-spindle.

Allen BB 5-spindle.

Allen BB Type B sgl. spdl.

Demco DAH BB, MD.

36¹/₂ Cincinnati BG PF SL.

25¹/₂ Hickford, G. & E.; Sld. Hd., P. F.

20¹/₂ & 24¹/₂ Prentice BG.

GRINDERS:

Disc, No. 6-20 Besly.

Disc, No. 220 Badger & press.

Drill, New Yankee, D. E.

Internal, Madison; No. 65 Head.

Surface, No. 210 Head 8¹/₂.

Surface, LaSalle.

HAMMERS:

50-lb. Little Giant MD.

40-lb. Bradley Herve.

LATHES:

24¹/₂x14' Niles, P. C. G.

18¹/₂x8¹/₂' Rahn & Mayer.

18¹/₂x8' Rahn-Larmon.

18¹/₂x8' Lodge & Shipley MD.

15¹/₂x6' Flather, S. B. G.

14¹/₂x6' Lodge & Shipley.

11¹/₂x4¹/₂' Artisan, gap bed.

LATHES—Turret:

16¹/₂ Type A Cisholt 6¹/₂" hole, No. 3 Foster 14¹/₂".

MILLERS:

No. 25 Becker-Brainerd.

No. 3 Becker-Brainerd, plain.

Gooley & Edlund Slab Miller.

PRESSES:

Hydraulic, 42-ton Elmes.

OBI, Nos. 0, 2, 3 Loshough-J.

O. B. I. No. 2 Sidney.

O. B. I., No. 30 Swaine.

Foot Press, No. 4 Swaine.

Arch Press, No. 40 Swaine.

PUNCHES & SHEARS:

Queen City DE, 1¹/₂ in 1¹/₂", M. D.

Rock River L, 1¹/₂ in 16¹/₂"; 24 thr.

Cleveland C, SE, 3¹/₂ in 1¹/₂", 26¹/₂ thr.

No. L-10 Badger, DE, 1¹/_{2 in 1¹/₂"}

No. 14¹/₂ W-W, 25¹/₂ thr.; m. d.

SHEARS:

Jig, GEM, 18 ga. cap., M.D.

Rotary Bevel, Lenox 3¹/₂".

Square, Stark 9"; 18 ga. cap.

THREADERS, Pipe & Bolt:

Murphy, 3¹/₂ dbl. head, bolt.

Pipe, 2¹/₂ Oster M. D.

MISCELLANEOUS:

Bender, No. 15 Wallace.

Dbl. Seamers, Swaine.

Compressor, H-B CCB, 14x9x8, 20 HP motor.

Groover, 30¹/₂ Toledo.

Planer, 30¹/₂x30¹/₂x8' Pease.

Planer, 30¹/₂x30¹/₂x8' Wheeler.

Metal Band Saws, 14¹/₂ Racine.

Roll, corrugating, 10¹/₂ Robinson.

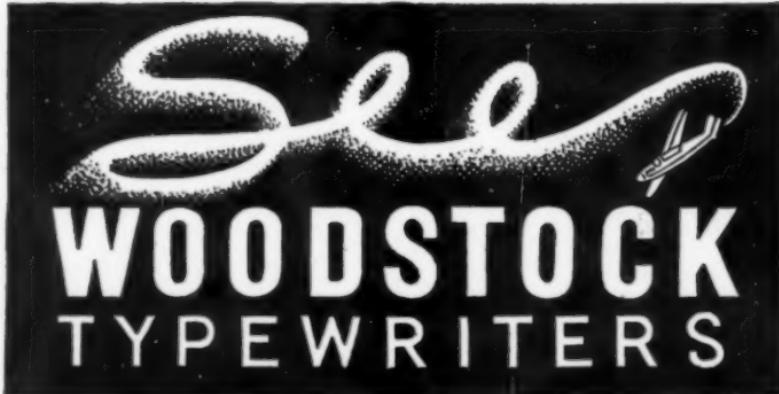
Screw Machine, No. 2 Garvin,

No. 2 J. & L.

Saw, cold, Higley 20¹/₂.

Shaper, 20¹/₂ Smith & Mills.

Brown Mch. Co., 2333 N. Ninth St., St. Louis, Mo.



BORING MILLS, Horizontal

4- $\frac{1}{2}$ " bar Niles Knee Type.
6" bar Barrett Cyl. Borer.
4- $\frac{1}{2}$ " bar N.B.P. Knee Type.
M.D.

BORING MILLS, Vertical

60" Niles, 2 swivel heads
60" Betts, M.D.
48" Gisholt, P.R.T., M.D.
44" Putnam, P.R.T., M.D.
42" Bullard, P.R.T., M.D.
30" Colburn, 1 Turret Head.

DRILLS, Radial

6" Cinci. Bickford Extra Hwy.,
17" cl.
6" Cinci. Bickford, Standard
6" Amer. Univ. S. P. D.
12 spindle Bausch No. 4 M.T.
3" American, Sensitive.
3" American, Cone Drive
4" N. B. P. Semi Univ. M. D.
5" - 6" Amer. Tri. Grd.
2" spindle Allen M.D.
4 Spindle No. 28 Edlund.
4 Spindle Kokomo, No. 3 M.T.
24 spindle Bausch No. 2 M.T.
26" Barnes Camel Back (5).

GRINDERS

6"x32" Norton, Countershift
8"x54" Fitchburg Pl., m.d.
10"x52" Landis Plain.
10"x50" Norton Self Cont.
16"x68" Landis Crankshaft
No. 6 Bryant Chucking
No. 3 Landis Universal
18" Besly No. 26 Disc.
18" Badger No. 220 Disc.
20"x96" Landis Univ.
84" Diamond Face, 36" whl.
No. 11 Landis Tool & Cutter
No. 55, 60 and 65 Heald Cyl.
1 $\frac{1}{2}$ " New Yankee Twist Drill
Heim, Centerless.

LATHES

14"x8" LeBlond Q.C.G.
14"x6" Carroll Jamieson,
Cone M.D.
14"x6" L & S. Q.C.G. Cone
14"x6" Hendey Q.C.G. Cone
M.D.
16"x10" Monah L.C.G. Cone
18"x8" S. & B. Q. C. G.,
Cone, T.A.
18"x8" Lodge & S. Cone.
19"x8" LeBlond, Cone.
20"x12" New Haven, T.A.
24"x14" L & S T.A., Cone
26"x10" Pond, Q.C.G., Cone.
30"x16" N.B.P. Axel & Jour-
nal, Center Drive, M.D.

LATHES (Continued)

32"x17" Fifield, triple grd.
36"x14" Pond, Grd. Hd., M.D.
36"x16" Putnam, raised, 47".
36"x24" Bridgeford, M.D.
42"x20" L & S. Cone, Q.C.G.
42"x34" S. & B., Grd. Hd.,
M.D.
42"x30" Johnson Grd. Hd. M.D.
42" N.R.P. Center Dr. Whl.
48"x60"x14" Putnam, Heavy
48"x36" Fifield, m.d.
60"x34" Putnam, raised to
72"
90" N.B.P. Heavy. Wheel

MILLERS

Model CS Becker Continuous.
Model C Becker, Vert., S.P.D.
Rotary Table
No. 26 Becker Pl. Cone
No. 6 Jackson Die Sinkers (3)
No. 5C Becker Vert., 14" Ro-
tary Table
No. 4 LeBlond Pl. Cone M.D.
No. 3B B & S Pl. S.P.D.
No. 2 Cinci. Cone, Univ.
No. 1 Standard Hand
Thread Miller, 4 $\frac{1}{2}$ "x18" P&W.

PLANERS

48"x48"x12" D&H Openside.
48" x 48 x 10" Gray, 2 Hds.,
42"x42"x10" N.B.P. 4 hds.
Rev. M. D. with 25 h.p. DC
Motor
36" Newton Rotary, M.D.
36"x30"x12" Chandler, 3 hds.
36"x36"x20" Chandler, 2 hds.
30"x30"x10" D. & H. Openside.
30"x30"x8" Powell 2 hds.
27"x27"x6" W. & P., 1 Hd.
24"x24"x12" American
24"x8" Gray; 24"x7" Niles.

TURRET LATHES

1 $\frac{1}{2}$ x18" P. & W., bar
1 $\frac{1}{2}$ x15" P. & W., bar
No. 3 Bardons & Oliver, 11"
bar Capt.y
No. 3 Cinci. Acme Univ. S.
P.D., 3- $\frac{1}{2}$ " H.S.
No. 4 Warner Swasey — not
back geared
No. 6 Foster, 2- $\frac{1}{2}$ " bar.
No. 9 Bardons & Oliver, 3"
H.S.
No 8 Warner & Swasey, 3- $\frac{1}{2}$ "
bar Capt.y
24" Gish. 6 $\frac{1}{2}$ H.S., 2 Cone
28" Gisholt M.D.
3 $\frac{1}{2}$ "x36" Cinci Acme Geared
Head, Bar, (2)
3 $\frac{1}{2}$ "x36" Cinci. Acme Geared
Head, Chucking
No. 12 S.G. Garvin Screw, 2"
bar Capt.y
3 $\frac{1}{2}$ x36" Pratt & Whit., bar eq
2 $\frac{1}{4}$ "x24" & 3"x36" J. & L.

MISCELLANEOUS

Automatic, 2 $\frac{1}{4}$ " Gridley, 1 Sp.
Automatics, 2- $\frac{1}{2}$ " - 3- $\frac{1}{2}$ "
Clev., Model A Sgl. Sp. (2)
1 $\frac{1}{2}$ "-2" Gridley 4 spin. Mod-
el F (4)
No. 5A Potter & Johnson
Crane, 25 ton Whit., 47'2" s.
Billet Breaking Mach., Ajax.
Bolt Threader, 2" Landis.
Brake, Box and Pan, 6"x10 ga.
8" fingers, M.D.
Broach, No. 2 Lapointe Belt.
Chuckings, Nos. 34 & 23 N. B.
Die Sinkers, No. 6 Jackson (3).
Flanger, $\frac{1}{2}$ " McCabe Pneu.
Gear Cutter, 110" Newton Spur
Gear Generator, No. 1 Lees-
Bradner.
Gear Gen., 11" Gleason Bevel
Gear Hobber, 6" Pfauter.
Gear Hobbers, No. 12 Barber
Coleman, P.R.T. (2)
Gear Hob., No. 3 Farwell 24"
Gear Hob., No. 1 Farwell 12"
Gear Planer, 24" Gleason.
Hammer, No. 2B Nazel, M.D.
Hammer, No. 3B Nazel M.D.
Header, 1 $\frac{1}{2}$ " Acme Rivet.
Header, 2" Acme, Steel.
Keystrs., No. 1 Bak, No. 1 Dav.
Keyseat, Nos. 2, 3 & 4 M.A.M.
Nibbler, 36" Gray, 1", No. 3.
Pipe Bender, 6" Federal, Type
E.

Pipe Mach. 4" Landis, M.D.
Pipe Mach. 8"x12" Williams
Pipe Machine, 12" Saunders.
Pipe Mach., 12" Curtis & C.
Pipe Mach., 2" Bignal Keele.
Press, No. 8 $\frac{1}{2}$ Z & H Perucas
Press, Forcing 50 ton Lucas
Press, No. 3A Bliss, Dble. Ck.
Press, No. 61 Spec. V & O
Presses, No. 18 Bliss B. & Fl
Punch & Shear No. 47 PBC B.
Punch & Shear, Buffalo No.
25U Armor Plate, 4 $\frac{1}{2}$ "
angles, 1" thru bar 1 $\frac{1}{2}"$
Punch 54" H & J No. 2 D.E.
Punch, 36" Whit., 4 $\frac{1}{2}$ "x4".
Rolls, 6x1" H. & J. No. 2
Rolls, 8x1" H&J No. 2.
Saw, No. 3 Ryerson Frict. D.C.
Saw, 9"x19" Peer Hack, M.D.
Saw, 8" Avey Millband.
Saw, 8" Gorton No. 2B Inter.
Saw, 6" Peerless Univ. M.D.
Saw, 10" Napier Band.
Shaper, 24" Gould & Eberhardt
Shaper, 16" Stockbridge Cone
Shaper, 20" Cincinnati, Cone
Shaving Mach. P. & W. Vert.
Alligator Shear, Carlin 1- $\frac{1}{2}$ " Sq.
Shears, 10"x1" L & N. M.D.
Shears, 8x1" H&J. No. 2 12"
gap.
Shear, 30" Cleveland, No. X.
Shear, 150"x1" United, 36" x.
126"x14" Amer., 22" Gap.
Slotted, 15" Putn., D.C., M.D.
Slotted, 20" Betts, D.C., M.D.
Slotted, 24" Dill A.C., M.D.

BENNETT-RAFKIN MACHINE TOOL CO., Inc.

Offices: 30 CHURCH ST., NEW YORK CITY

To Give You **QUICK DELIVERY**—

and the Nation Wide Demand for **MACHINE TOOLS—PRODUCTION MA**
Interstate Has Tremendously Increased Shop and Shipping Facilities. Your

AUTOMATIC SCREW MACHS.

8 Model B 4-Spindle Acme,
3" Capacity

Cleveland, 1" 11" 2" & 23"
Model B; 4 1/2" Gridley; 8 Spindle
New Britain—1 1/2" cap.;
No. 60 B. & S.; No. 1, 2, 3
Manville

BORING MILLS—VERT.

10' Pond, vert. 96" table; 30"
and 72" Colburn rapid tra-
verse vert.
50" Bullard, 2 hds.
52" Niles, 2 hds.
30" Colburn

BORING MILLS—HORIZ.
No. 300 G. & L. 4 1/2" bar;
Braman & Smith, 5" dia. sp.
12" Niles Cyl. Dbls. End
7" Bar Putnam-table type;
4" Gisholt

BRACKES, CHGO. STEEL
Hand—3'16, 4'12, 4'16, 6'16,
8'18, 8'16, 8'14, 10'14, 10'
16, 10'18
Box & Pan—4", 5" 14 ga., 4" &
6" 10 ga. 10' 10 ga., 10'16 ga.



30' BIRDSBORO HYDRAU-
LIC POWER PRESS BRAKE
OR FORMING PRESS;
Capacity approx. 5/8" plate.
Self-contained with controls,
upper and lower die holders.

Power—10' 1" 12' 1" 12'
3/16" 10' 10 ga.—8'12"
6" 10 ga. 6' 12 ga.

DIESEL ENGINE

100 H.P. Venn Sever. only
3 years old — 75 H.P.
Generator & Heater Direct
Connected

GRINDERS

2 — No. 2 Cin. Centerless

Grinders Tuxedo drive

Heald Rot. Sur. 16" Mag chuck;
No. 23 Nortons Cyl. 2 1/4" x 14 1/2"

No. 96 Nortons sur. 15x15x96"

IRONWORKERS, UNIVERSAL

Pels No. 20, 6" x 6x1"; 4x4 1/2"

Smith No. 91-16, Capacity 6" x

6x2 1/2"; with notching attach.

Smith No. 91-13, Capacity 4" x

4x2 1/2"; with notching attach.

LATHES

18"x16" Monarch Timken bear.

Selective Geared Head Bridgeford 26"x9 ft. and 34"x

16 ft. G.H. 15 speeds

28"x12 ft. Boye & Emmes

16"x6 ft. Hendey-Yoke Hd.

Am. Grd. Hd. 18x8: 24x16:

16x8 Bradford: 18x16 P&W:

30x18. L&S 18x16 10" Grd.

Hd. M.D. 30" Pit Lathe, 156"

face plate

LATHES — TURRET

Warner & Swasey—No.

4, No. 2-A, No. 6;

Potter & Johnson

No. 6-A

28"x24" Gisholt;

28" Pond

MILLERS

UNIV. No. 3 B. &

S.; Kemp's Table

8x34" 10x34"

VERTICAL — No.

2 B&S; Becker Nos.

2, 4, No. 4 Gar-

vin; No. 2 Knight;

PLAIN No. 3-B K

& T. No. 3 & 4

Cin. high Power:

No. 5 Lg. Blond,

S.P.D.; No. 6 &

2Y B&S.

PLANERS

20' Niles: 26"x8"

Clev. Opens.

26x6 Cincinnati

60x60x18 ft. Pond

30"x30"x10 ft.

36x30x10 ft Am.

ROLLS
Angle, 4x4 1/2" G.H. M.D.
Wickes, Pyramid Type, with mtr.
Drop End Housing, sizes—18"
11" 12"x11"; 8 ft. 1/2" Berthas
10 Ft. Wickes Vert. 1 1/2" cap.
6" Beloit, 3/16" cap. m.d.

RADIAL DRILLS

American 2 1/2"; 4"; 6"; West. 6";
3" Fosdick; 6" Carlton M.D.

HARDINGE BENCH LATHE UNIT

Four 2" cap. Hardinge Cat-
aract bench lathes on single
bench with motor, with collets

ROLLER DIE MACHINES
4, 5 & 7 Spindle Yoder

ROLLER LEVELLERS
McKay 60"-66"-48"-38"-96"

SAWS—FRICTION

Ryerson No. 0, No. 1, No. 2

SHAPERS

G.&E., Invincible, 32", 28", 24"
Cin. 20", 16"; 24" Am. & Mill.

INTERSTATE'S Latest Catalog No. 404

Describes over 2000 machines in stock—
READY FOR IMMEDIATE SHIPMENT.

**SEND FOR YOUR FREE
COPY TODAY**

SHEARS

Throatless, Marsh. No. 10P, No.

112M; 1 & 8"

POWER 18" 1" 10" 1" United

Cincinnati, Chicago Steel, Berthas,

Niagara, 10 Ft. 3 1/16".

Niagara 10" 1" 18" gap.

12" 14"; 12" 10"; 8 1/2" Beatty

10" 10 ga. Streine

Nia. 10" 10 ga. M.D.; 5" 10

ga.; 3" 10 ga.

WRITE, WIRE OR 'PHONE FOR

INTERSTATE
Machinery Co., Inc.



CHICAGO, ILL.

YARDS 5800

To Meet Your IMMEDIATE NEEDS

CHINERY—SHEET METAL and STRUCTURAL SHOP EQUIPMENT—Inspection Is Invited.

30¹/₂ ROLL—Diameter of top roll 26¹/₂; lower rolls 20¹/₂ each. Drop end housing, hydraulically controlled; motor drive. Estimated weight 640,000 lbs.

20¹/₂ ALLIANCE PINCH TYPE POWER BENDING ROLL; Similar Construction.

30 ft. and 20 ft. ALLIANCE BENDING ROLLS



PRESSES, Toggle

Bliss Nos. 5, 5A, 3½B, 31, 1½; Toledo Nos. 268½, 168½, 184; No. 99 Stell.

PRESSES, Hydraulic
100 & 200 ton Litchf.

PRESSES, HORN

Nia. Nos. 15, 116
Bliss Nos. 39, 40, 21, 83
Toledo Nos. 14, 42, 41A, 43P

PRESSES, Straight Side

No. 80½ Bliss—32" str. M.D., Tie Rod.
No. 4019 Hamilton 800 ton
No. 78½, No. 77½ Bliss
No. 59 Toledo 18" stroke
No. 305 Bliss 6" str. (3)

PRESSES, Double Crank

Bliss No. 8 Tie Rod; No. 23A
No. 163-A Cons.

Hamilton, No. 6010½—tie rod 10½" shaft; No. 425—tie rod 8" str. No. 163-A

PRESSES, O.B.I.

Nos. 1, 2, 3, 4, B, G, Bliss
Nos. 5, 6, No. 6 Bliss Cons.
M.D.—like new

No. 75 Cons. B. G., all V belt
M. D. with motors

Bliss Nos. 20, 21, 102 dbl. crk.

MISCELLANEOUS

Air Compressors — 12x7x10
Chgo. Pneu. 67 H.P. Syncr.
Motor built in flywheel, 354
CFM

Bulldozer, No. 4 L&A 16" str.

Drill, Mult sp. No. 13 Nato

Hydraulic Scrap Baler—150 lb.
bales. Galland & Henning,
66" x 16½" x 24" Chamber

Flanger ½" McCabe

Nibblers No. 2B Camp. 30" th

Press Brake—10'10" ga. Ohl

Presses—Deep Throat—

Toledo—No. 15 & No. 17; No.
20 Excelsior

Presses, Knuckle Joint Embos.
600 Ton Waterbury Farrel No. 7
Z. & H.; 250 ton American
Minster—150 ton—Tie Rod, M.
D. (Practically New)

Gang Punches, Bertsch, 48"
betw. housings; No. 6 Hilles
& Jones Mult. Punch, 8' be-
tween housings; No. 2 L&A—
8½" x 96" bed

Punches, sgle. end 72" thr. 2" x
1" cap.; 36" throat cap. 1½" x 1"
Slitters, Gang, 24" 32" 36" 48"
72" Stamco

Welders, Spot 100 KW Federal
5, 7½, 10, 15, 20 KW; 50
KVA Gibb Sean Welder; 250
KW Federal Projection Welder
M.D.

NEWBOLD PLATE LEVELLER AND STRAIGHTENER

96" wide; 13 rolls and 2
pinch. Motor drive with 75
H.P. A.C. 3 phase 60 cycle
220 volt motor and control;
gears running in oil; Uni-
versal joint drive. Individual
adjustment for rolls

'PHOTOS AND DETAILS

INTERSTATE
Machinery Co., Inc.



NEW 3 Phase B. B. Motors $\frac{1}{2}$ to 25 H. P., 5 H. P. \$55.75

DRILLS

Lever, Wheel & Lever and Power Feed.
and 28" sliding head, back gear, power feed.
uech Multiple 16 spindle No. 1 Morse Taper.
pinde Foote-Burt, heavy duty.
pinde Hole Hog No. 1 Morse Taper, power fd.
2 and 4 spindle high speed 8" overhang.
Bausch Radial Drill.
other drills of various sizes and types.

MISCELLANEOUS

ake, Robinson, toggle, 5".
akes, 6' and 10' for 18 gauge.
inders, cutter and cylindrical, plain and univ.
This is only a partial list of our large stock, which is constantly changing. Write for what you need.
HE OSBORNE & SEXTON MCHY. CO., Dept. H. COLUMBUS, OHIO

Good Used Machine Tools for Sale:

- No. 4 CINCINNATI PLAIN MILLER, s.p.d. arranged for motor drive
- No. 4A BROWN & SHARPE UNIVERSAL MILLER, s.p.d., dividing head
- No. 1 1/2B KEARNEY & TRECKER PLAIN MILLER, motor drive, all geared feeds and speeds, double overarm, vise
- 1A MILWAUKEE PLAIN MILLER, single pulley drive
- No. 1 OHIO UNIVERSAL MILLER, single pulley drive, arranged for motor drive, complete with dividing head
- No. 1 1/2 BROWN & SHARPE UNIVERSAL MILLER, cone drive, back geared, geared feeds, universal dividing head and universal milling attachment
- No. 1 1/2 VALLEY CITY UNIVERSAL MILLING MACHINE, cone drive, back geared, geared feeds, dividing head
- 32" x 22" x 10' INGERSOLL PLANER TYPE MILLER, motor drive, through gear box. 2 side heads, one vertical head, fixed rail type
- No. 6 WARNER & SWASEY TURRET LATHE, cone drive, double friction back geared, power feeds to turret and to cross slide, equipped for chucking work.
- 18" Model "A" LIBBY UNIVERSAL TURRET LATHE, single pulley drive, all power feeds, equipped for chuck work, hole through spindle 3 9/16"
- 22" LIBBY UNIVERSAL TURRET LATHE, single pulley drive, all power feeds, hole through spindle 4 1/4"
- TWO—24" STEINLE TURRET LATHES, single pulley drive, power feeds in all directions, equipped for chucking work, hole through spindle 6 1/4"
- No. 0 FOSDICK (GIDDINGS & LEWIS) HORIZONTAL BORING MILL, single pulley drive through gear box. 3" spindle, distance between spindle and outer support 60", working surface of table about 18" x 45 1/2"
- No. 14 PRATT & WHITNEY VERTICAL SURFACE GRINDER. Belted motor drive, complete with electrical equipment, 20 H.P. 220 volt AC motor. Working surface of table about 12 x 36", grinding wheel dia. 14", with magnetic chuck
- 10" x 36" LANDIS SELF CONTAINED PLAIN CYLINDRICAL GRINDER, with standard equipment
- No. 14 BROWN & SHARPE PLAIN CYLINDRICAL GRINDER, capacity 10 x 18". Very modern tool
- 16 x 72" CINCINNATI UNIVERSAL GRINDER, 3 motor drive
- No. 3 MODERN TOOL WORKS UNIVERSAL GRINDER, capacity 13 x 40", belt drive
- TWO—No. 1 GARVIN TWO SPINDLE PROFILERS
- TWO—20" GOULD & EBERHARDT, shaping machines, back geared, cone drive, with swivel vise.

Laurens Bros., Peoples Bank Bldg., Cincinnati, Ohio

Parkway 3315

"The Used Machinery House Known Everywhere" — McCabe & Sheeran Machinery Corporation

Machinery worth knowing about right here and NOW.

Secure for IMMEDIATE Delivery Such High-grade "Used" Equipment—and NOW'S the time to act, if at all—at all.

UPSETTERS—1½" Acme Upsetting & F. Mach. 2" Acme All Steel Head, Upset. & F. Mach.

BOLT MACHINES—1½" Landis Bolt Thrd. S. H. 2" National Bolt Threader, Single Head

BORING MILLS—Vertical—

18/24" swg. Sel., 2 hds; Reeves Var. Sp. Dr. 10/16" swing, Niles, 2 heads; Motor-drive 60" Swing, Belts, 2 heads; motor-drive All Sizes down to 30"

RADIAL DRILLS—6' arm, American Full Universal, Gear Box 6' arm, Cincinnati Bickford Plain 4' arm, N-B-P. Semi-Universal; Gear Box

UPRIGHT DRILLS—3-Spindle, Barr, 12" swing Single Spindle Aurora, 22" swing, Sliding Hd.

GRINDERS—18"x84" Landis Crankshaft

18"x68" Landis Crank Pin Grinder
Dbl.-end Blount No. 7, Cap. wheels 24"x2¾"
Dbl.-end, Blount No. 3, Cap. wheels 12"x1½"
Wet Tool, Bount, Sgl. Whl., 18" diam., 2¼" f

GEAR CUTTER—36"x8" G.&E. Spur; Sgl. p.dr.

HAMMERS—1500-lb. Chambersburg, Stm. Dr. 1100-lb. Bement Miles, Steam 600-lb. Niles Bement Pond Steam

HOISTS—2-ton Shepard, Electric, 3 phase, 60 cycles, 220 volts; (2) 2-ton Amer. Engr. Co., 3 ph., 25 cyc., 220 v.; (2) ½-ton American Engr. Co., 3-ph., 25-cyc., 220v. Chain Hoists, 3-ton capacity (2)

LATHES—60"x70' Double-end Hogging 60"x34' Putnam, with 11" raising blocks 60"x26' Pond, Heavy Duty 60"x20' New Haven

42"x72" Standard Gun Boring Lathe 42"x20' Lodge & Shipley, 36"x16' Putnam Car Wheel Lathe, 42" swg., N-B-P., Cent. dr. Banding Lathe, 42" swing, 10½" bed, Electric Service, for Armatur turn., etc., Motor-dr. Write for special circular

30"x28' Greaves Klusman, Q.C. b-d. Axle Lathe, 30" swg., 16' bed, N-B-Pond Wheel Lathe, 90" swing, Double Head 20"x8' Putnam (40 other Lathes available)

PLANERS—10' wide, 66" hi.,tbl. 18' long, Bed 48" wide, 48" hi., table 14' long, D.&H. Op. 36" wide, 36" hi. table 20' long, Chandler

PRESSES—2000-ton, Tol. No. 669 Draw. Pres. 750-ton, Mesta Four Column Hyd. Forgin 500-ton, United Four Column Hyd. Forgin 450-ton, Wood, Hydraulic Flanging Wheel Press, 400 ton, Hydraulic Bliss No. 21, Bolster Plate 28"x22"

MISCELLANEOUS—Pipe Machine, 2½" to 10 Standard Engr. Co.

Punches & Shears, 25 avail., up to 60-in. the Squaring Shears, up to 156-in. blades

Riveters, up to 100-ton capacity Bending Roll, Vertical, Capacity 12' x1½" Bending Rolls, Brand New, Capacity 10'x1½" Friction Saws, "Ryerson"

Column Facers, 30" capacity, Espen Lucas (2 Bend. Mch., 4 Slide, Baird, Cap. up to %" Diesel Engine, 90 H.P. Worthington

Bulldozer, No. 9 Williams & White Shaper, 16" stroke, Stockbridge, Vise

Electric Oven, "Westinghouse" Type M; 90" deep; 7" high; 104" wide Arc Welder, 150 Amp., 3 ph., 25 cyc., 220 volts Air Brake Testing Racks

Squaring Shear, 36" wide, 15" gap Lockers, Dbl. Dr.; 15" deep, 42" hi., 11" w.(66) Steam Hammer, 600 lbs. "Niles-Bement-Pond"

Blacksmith Tools and Equipment, Tong, etc. Vises, Anvils, Scales, Forces, Hand Trucks, Small Surface Plates, Pinion Puller

Tool Room, Complete shelving, compartments, Reamers, Drills, Taps, Dies, etc.

COMPLETE LIST NOW BEING MADE UP — WRITE —

MCCABE & SHEERAN
ACHINERY CORPORATION

(REG. U. S. PATENT OFFICE)

**50 Church St.,
New York**

ENGINEERED
Machine Tool
REBUILDING



"The World is Our Field"

PLANERS

36" x 36" x 16' Cleveland Openside
 48" x 48" x 16' Detrick-Harvey Opens.
 48" Newton Rotary Planer
 60" x 60" x 12' N-B-P Heavy Duty.
 92" x 87" x 42' N-B-P, Revers. Mtr. Dr.

BORING MILLS

10-16' Betts Hd. Ext. Type Vert.
 100" Poole HD Vertical, M.D.
 14'-20' N.-B.-P. Vertical
 72" Betts Vertical Heavy Duty
 52" Betts HD Car Wheel

**4 1/4" Bar Sellers Knee Type Horiz.
 GRINDERS**

No. 6 Bryant Internal Chucking
 No. 4 Landis Univ. crankshaft attach.
 No. 2 Sellers Tool Grinder
 Gisholt Universal Tool Grinders
 40" x 20' Landis Cyl. Grinder, pl. m.d.

LATHES

30" x 13' H.S.G. Heavy Cone Drive
 30" x 28' N-B-P Bor. & Turn. Lathe
 32" x 16' Bridgeford, Geared H., M.D.
 32" x 18' Bridgeford Grd. Hd., S.P.D.
 26/46" x 20' McCabe, Double Spindle
 36" x 18' L&S. B.G. Standard Engine
 42" x 22' Bridgeford, Grd. Hd., M.D.
 60" x 40' Wright, two carriages, M.D.
 90" N-B-P Driv. Wheel, dble. qtr.

MILLERS

No. 3 Becker Vertical
 No. 14 Cochrane Bly, slot. hd., M.D.
 No. 33 B & S Automatic
 24" x 30" x 10' Ingersoll Horiz. Slab
 Vert. Spdle.

SIMMONS MACHINE TOOL CORP.

1725 Broadway, Albany, N.Y.

Singer Bldg., New York City

GUARANTEED MACHINES—

AUTOMATIC SCREW MACHINES

Clevelands	Model	Ser. No.	Driv.
14—3 3/4"	A	34000	Plain
3—3 3/4", 1 1/2"	B	31000	Plain
7—11 1/4"	B	34000	Plain
2—2 1/2"	B	34000	Plain
1—3 1/2"	A	33000	M.D.
4—3 1/2" 4 spdl.	M	33000	M.D.

Brown & Sharpe's

No. 00G Full Auto.	6800	S.P.
No. 00 Full Auto.	5988	Plain
Gridleys		
1—1 1/4" 4 spdl.	F	5000
1—1 1/4" 4 spdl.	F	7500
1—7 1/2" 4 spdl.	G	8600
1—1 1/4" 4 spdl.	G	10000
3—3 1/2" 4 spdl.	F	4400
4—2 1/2" 4 spdl.	F	8000

HAND SCREW MACHINES

No. 3 A W. & S. Univ. wire feed, SPD.	equip.
No. 1 & 7 Foster, plain head, Auto. Chuck	
No. 4 B. & S. Wire Feed Pwd. Feed	
No. 2 B. & O. wire feed collets, B.D.	
No. 4 Acme F.B.G. pwd. feed, wire feed, B.D.	
No. 2 Millholland, wire fd., collets, Arr. M.D.	
No. 6 W. & S. F B G. Belt driven	
21"—Gisholt Turret Lathe Univ. B.D.	
14—No. 1, 2, 4, 6 W. & S. F.B.G., B.D.	

DRILLS

1, 2, 3, 4 spdl.	Allen H.S. BB., B.F. 1/2" cap.
1, 3 Spdl. Lel-Gif.	14" Swing. H.S. B.B. 1/2" cap.
1 Spdl. Avey No. 2 M.T. H.S., BB., 1/2" cap.	

IMMEDIATE DELIVERY

GRINDERS

No. 70 Heald Internal Ser. No. 2400, BD.
No. 103 Rivett Internal BD.
No. 2 Norton Cutter Gr. Equip., BD.
No. 1 C.O.S. Walker Cutter grinder BD.
No. 3 Wilmarth & Marmon, wet surf. Gr.Ch.
No. 3 Van Norman 4" x 15" Cyl. M.D.
No. 12 B. & S. Plain Cyl. 12" x 36" B.D.

LATHES

So. Bend 13" x 6" Gap Pla. Ch. Bd.
So. Bend 15" x 5" Pl. Ch. chuck B.D.
Schumacher & Boye 18" x 10" Q.C. tap. att.B.D.
Hendey 18" x 12" Q.C. S.B.G. chuck, B.D.
Greaves Klusman 18" x 6" plain with turret
Monarch 18" x 6" Geared head, tap. att. MD.

MILLERS

No. 2 Knight Vertical Univ. with slotted, B.D.
No. 9 Kempsmith Plain arbor B.D.
Hand Millers, Chgo. Whitney, Pratt & Wright
8" Pratt & Whitney Prod. Mill Arr. M.D.

PRESSES

25 ton Henry-Wright, dieing, with feeds, B.D.
No. 15 Robinson, horn type, table, direct M.D.
No. 3 R. & K. O.B.I. 2 1/2 str.

No. 4 1/2 Niagara O.B.I. 27 ton

SHAPERS

16" Rockford, Vise C/S
20" Steptos, B. G. vise, C/S

MISCELLANEOUS

36" Niagara Power Sq. Shear 14 gauge
G. & E. Rope Drop Hammer, 75 lb. cap.
Hammers, High Speed, 3A and SA
Keyseater No. 2 Mills & Merrill, equipment

SCOTT MACHINERY SALES, INC., 1811 CARROLL AVE., CHICAGO, ILLINOIS

HIGH GRADE TOOLS

- 16" x 6' Lodge & Shipley Grd. Hd. M.D. 12 speed.
- 16" x 8' American Grd. Hd. 12 speed, Motor in base.
- 18" x 8' Monarch Grd. Hd. Motor in Base.
- 18" x 8' Lodge & Shipley Grd. Hd. M.D. 12 speed.
- 20" x 8' American Grd. Hd. 8 speed.
- 30" x 10' American Grd. Hd. 12 speed, M.D.
- 30" x 16' American Grd. Hd. 12 speed, M.D.
- 30" x 24' American Grd. Hd. 12 speed, M.D. 2 carriages
- 48" x 48" x 16' Pond Planer, H.D. 4 heads, Arr. M.D.

LATHES

- 14"x6' & 16"x6' LeBlond 3 S.C.D. D.B.G.
- 19"x6' Le Blond, Q.C., 3 S.C.D.
- 21"x10' LeBlond, 3 S.C.D. D. B. G.
- 25"x16' LeBlond, 3 S.C.D., D.B.G.
- 20"x6' American, 3 S.C.D. D.B.G.
- 20"x16' American, 3 S.C.D. D.B.G.
- 18"x24' Lodge & Shipley Engine Lathe.
- 30"x16' Lodge & Shipley Cone Q.C.
- 20"x10' Hendey Cone Q.C.

- No. 2 Kempsmith Univ. Vert. Hd.
- No. 2 Kempsmith Cone, M.D.
- No. 3 Kempsmith Universal Cone.
- No. 2 Hendey Universal S.P.D.
- No. 3 LeBlond Plain 3 S.C.D.

PLANERS AND SHAPERS

- 24" Kelly Shaper, Cone drive.
- 24"x24"x6" Gray Planer.
- 36"x36"x14' Detrick & Harvey Openside
- 16, 20, 24" G & E Shapers, cone drive.
- 16, 20, 24 and 28" Gould & E. Shapers, S.P.D.

GRINDERS

- New Schuchart & Schutte Hob Grinder (Barg).
- No. 16 Brown & Sharpe Plain.
- Diamond Face Grinder.
- No. 1 Diamond Surface Grinder.
- No. 50, 550, 60, 65, 70 Heald Internal.
- No. 75 Heald Internal.
- 6"x18" Landis Plain, Self Contained.
- 10"x36" Landis Plain, S.C.
- 53" Besley Ball Bearing Vert. Spindle Disc.

RADIAL AND DRILL PRESSES

- 3 1/2', 4', 5', 6' Amer. Triple Geared S.P.D.
- 4', 6' American Triple Purpose S.P.D.
- 6' American Trip. Purpose, M.D.
- 2 1/2' Mueller, S.P.D.
- 2 1/2' Cincinnati Bick, S.P.D.
- 21 1/2", 24" Cinc. B. Upright Geared Feeds.
- 24" Barnes Upright B.D.

BORING MILLS

- 48" Bullard Cone.
- 60" Gisholt, P.R.T.

TURRET LATHES

- No. 4 & 6 W & S Plain Cone Drive.

MISCELLANEOUS

- 2 1/2" Landis Bolt Cutter.
- No. 4 & 5 Mitts & Merrill Keyseaters.
- Model W Cleveland Pch. & Shr. 60" thrt., M.D.
- 8" x 1 1/2" Chicago Bending Brake.
- 6"x3/16" Chicago Bending Brake.
- No. 92D Toledo D.C. Press.
- No. 4A High Speed Riveter New.
- 2—No. 35 Niagara Presses New.
- No. 36 Niagara Press New.
- 10"x3 1/16" Sholl Power Squaring Shear M.D.
- 6"x6" Peerless Shaping Saw.
- 35 K. W. Federal Spot Welder.

GEAR CUTTERS

- No. 1, 2, 3 Adams Farwell Gear Hobbers.
- No. 18HM Gould & Eberhardt S.P.D.
- No. 11 B & S spur and bevel Gear Cutter.
- 50" Rhenania Gear Hobbing machine, C.D.
- No. 1 Cross Gear Tooth Rounder.

MILLERS

- No. 4 Cincinnati Hi.P. Cone 3 S.C.D.D.B.G.
- No. 4 Cinc. H.P. Cone Univ. 3 S.C.D., D.B.G.

CINCINNATI MACHINERY & SUPPLY CO.
217 EAST SECOND STREET **CINCINNATI, OHIO**

3000 MACHINES IN OUR WAREHOUSES

BORING MILLS

Barrett No. 2 cyl., 5" bar.
Colburn 34" Vert., M.D.
Colburn 42"—Two Head.

DRILLS

P. & W. Nos. 11, 12, 18 Mult.
American 3" Radial
Morris 4" and 5" Radials.
Prentice 6" Radial.
Allen 3", 4" & 6" sp. B.B.
Henry 4" & Wright 4" sp. and 6" sp.
Avey 4" spindle No. 2.
Upright Drills—many makes and sizes.

GRINDERS

B. & S. Nos. 1, 2, 3. Univ.
Bryant Nos. 6, 10A, 18A, 8-A.
2 Sp. Hole, No. 40 Chuck.
Disc Grind.—All makes & sizes.
Nort., 6x32", 10x72", 14x72".

LATHES

Hendey Lathes—most sizes.
Pittsburgh 32" x 24", q.c.g.

MILLERS

Cinc. Nos. 1 & 2 Univ.

Hendey No. 1B Universal.
Becker No. 6 Vert., cone drive.
Lincoln Millers of all kinds.
Milwaukee Cam Miller.

Hand Screw M. of all makes & sizes; W. & S., Foster, B. & S., Potter & Johnston Nos. 5A, 6A Chuckers.

J. & L. 2 1/2 x 24 Steel Head
J. & L. 3 x 36 Steel Head.

PRESSES

Bliss No. 18, 19 & 20 O.B.I.
V. & O. No. 12, 14 D.A.C. In.
Wat.-F. No. 6 D.A. Pillar Cam.
Stoll No. 67, s.s.
Bliss Nos. 204 & 304 Straight Sided
Ferracute No. 105 D.A.
Terkelsen D-1 150 t. m. Spring Stand, No. 4-R S.S. Reducing.
W-F Long Stroke for shells.
Ferracute No. PG-P4.
Bliss No. 16, 4" str., Overh.
W-F Type for cartridges (20).
W-F Six Plunger for cartridge clips
W-F 3000 Ton Hyd. Hobbing

Broaches, LaPointe 1-2-3-4.
BURNISHING BARRELS, Abbott.
HAMMERS-BOARD DROP.
Hammer — Standard 800 lb. automatic.
HAMMERS — Chambersburg 1500 lb. Steam Drop (6)
Headers, many sizes & makes.
MEASURING MACHINES, P. & W.
12", 24", 48".
PLANERS-Detrick & Harvey 36"
x 36" x 12" Open-side.
ROLLING MILL, Robertson 12"x12"
for non-ferrous metal.
SHAPERS—from 1/2" to 32".
Shear—Niagara 10-14 Ga.
Straightener—Shuster, for wire.
Spring Coiler—Sleeper & Hartley No. 11 Univ.
Swagers—12" in stock.
TAPER—Threadnut No. 2 auto. nut.
Wire Formers, Nilson & Baird.

SCREW MACHINES

Grid. 9/16", 5/8", 11" Mod. G.
Clev. 5/8", 1/2", 5/8", 3/4", 2",
2 1/2", 2 1/2" Auto.
B. & S. Auto.—most sizes (we are specialists).
New Brit. 1x5", 1 1/2x7" A.

BOTWINIK BROTHERS, INC.

37-127 WATER ST.,

2-2

NEW HAVEN, CONN.

MISCELLANEOUS MACHINES

14x6 Mulliner-Edlund Tool Lathe
14x10 Am. q.c. Lathe with taper
16x8 Am. q.c. Lathe with taper
16x8 Lodge & Shipley cone dr.
17x8 Sidney q.c. Gear Lathe
18x6 L.&S. 12-speed Gr. H. Lathe
20x8' Hamilton Grd. Mfg. Lathe
21x10 LeBlond Cone Dr. Lathe
24x10 S&B cone hd. with taper
24x10 American Grd. Hd. Lathe
24x12 Am. 12-speed Gr. Hd. Lathe
32x14 L&S Cone Drive
32x28 Bullard Triple Grd.
No. 72 Heald Sizematic, m.d.
No. 3 Oilgear Hydraul. Broach, Mch.
Twin Ten Oilgear Hyd. Broach, Mch.
Rockford Dbl. End Hydraulic, m.d.
3A W&S High Hd. Univ. Tur. Lathe

1 1/2" Landis Dbl. Bolt Cutter, b.d.
2" Landis Dbl. Bolt Cutter, b.d.
3" Landis Sgle. Bolt Cut., leadscrew
C-13H Nateco Hydraulic Mult. Drill
No. 14 Nateco 16x24 Multiple Drill
No. 30 NATCO 24x40 Multiple Drill
No. 40 Natco Straight Line Mult. Drill
3 1/2" Western Radial Drill
3" Carlton Sensitive Radial Drill
6" Cincinnati Plain Radial Drill
Avey No. 3 Dbl. Spdle. Horiz. Drill
No. 6 Jackson Die Sink. Machine
48" Newton Dbl. Spd. Cont. Miller
No. 400 Curtis Oil Extractor
No. 304A Oster Pipe Machine
16" Heald Surface Grinder
24x24x6 Gray Planer
48x72x16 Cincinnati 4 hd Planer

WE CARRY A LARGE STOCK OF USED MACHINE TOOLS.

Your inquiries will be appreciated.

The Strong, Carlisle & Hammond Company

1392 West Third Street,
CLEVELAND, OHIO

Branch 2832 East Grand Blvd.
Office: DETROIT, MICHIGAN

VICTOR'S BARGAINS

IN NEW
CARBON, HIGH SPEED & TUNGSTEN CARBIDE TIPPED
Lathe Centers



These Centers are Ground and Hardened

Taper	Whole Length	Net Prices Carbon	Net Prices High Speed	Net Prices Tungsten Carbide Tipped
1	3 5/16	\$.45 ea.	\$ 1.00 ea.	\$3.00 ea.
2	4 3/16	.55 ea.	1.75 ea.	5.00 ea.
3	5 1/4	.95 ea.	2.25 ea.	8.00 ea.
4	6 3/4	1.30 ea.	3.25 ea.	12.00 ea.
5	8 1/2	2.70 ea.	5.75 ea.	18.00 ea.

**ORDERS FOR 12 OR MORE ASSORTED SIZES WILL TAKE 10% DISCOUNT
FROM ABOVE PRICES.**

SEND FOR OUR NEW 1939-40 GENERAL CATALOGUE.

Victor Machinery Exchange, Inc.

251 Centre Street,

New York, N. Y.

IMMEDIATE DELIVERY

No. 3 Manville Thread Roller, Hand feed.
 No. 1/2 Van Norman Duplex Miller, M.D.
 No. 5 AC Lees Bradner Gear Hobber, M.D.
 10x50 Norton Plain Grinder
 24"x14' Boye & Emmes Lathe, Cone Drive
 20"x8' Boye & Emmes Lathe, Cone Drive
 15"x8' Carroll Jameison Lathe, Cone Drive

4 spindle No. 2 Colburn Heavy Duty Drill, M.D.
 24" Cincinnati Drills. With & without tapping attachment
 20 ton Fox Super-Flex Straightening Press 1-1/2" New Britain Automatic
 No. 3 Wilmarth & Morman Surface Grinder

Send us your inquiries.

INTERNATIONAL MACHINERY CO.

3131 E. JEFFERSON

DETROIT, MICHIGAN



MOSER'S HIGH GRADE TOOLS

20⁸ 4-Spd. Barnes Drill, A. G., P. F.
 No. 3 Adams Gear Hobber.
 Oliver Cutter Grinder, 24⁸ cap. milling cutters, complete with motor.
 No. 1 Gardner Dbl. End Grinder, motor dr.
 14⁸x6' Walcott Q. C. G. Lathe.
 20⁸x10' LeBlond Q. C. G. Lathe.
 No. 0-1/2 LeBlond Plain Milling Machine.
 No. 1 Kempsmith Univer. Milling Machine.
 No. 4 1/2 R. & K. Punch Press.

Model 1H-12 Kearney & Trecker Manufacturing Type Milling Machine, with motor, excellent condition.

No. 0 Foster Screw Machine, A. C., B. F., collets.
 No. 2 Warner & Swasey Screw Machine.
 No. 4 Warner & Swasey Screw Machine.
 2-Spindle Jones & Lamson Steel Head Turret Lathe, with motor.
 F. B. Shuster Wire Straightener, 5/8" cap.

MOSER MACHINE TOOL SALES, 1600 W. CLYBOURN ST., MILWAUKEE, WISCONSIN

LATHES

60"x18' Niles, b.d., 12' centers
 54"x16' Johnson, m.d., triple grd.
 26"x10' Reed Lathe, belt drive
 18"x10' Greaves Klusman, belt dr.
 16"-24"x12' So. Bend Gap lathe, b.d.

DRILLS

4 spindle F. Burt, rail drill, 4 M. T.
 20 spdl. Natco, mtr. dr. 14"x27"

10 spdl. Natco, 13 1/2" dia. head, No. 1 taper M.D.

GRINDERS

6"x32" Norton Plain Cylindrical self contained motor drive with oscillating attachment for the wheel
 No. 103 Rivett Internal Grinder belt drive. Capacity hole diameter from 1/64" to 2"

MISCELLANEOUS

42" Bullard Vertical Boring Mill, Q.C. feeds, 2 heads

200 Ton Caldwell Hydraulic Wheel Press belt drive

ALSO BOILERS - PUMPS - WELDERS AND OTHER POWER PLANT EQUIPMENT IN STOCK.

THE O'BRIEN MACHINERY CO., 113 N. Third St., PHILADELPHIA, PA.

• UNUSUAL TOOLS •
SOLD WITH AN ABSOLUTE GUARANTEE OF SATISFACTION

Automatics

- 1½", 4 spindle Cone.
- 2" Cleveland Model A, s.s. (3).
- 3" Model B Natl. Acme, m.d. (2).
- Cleveland, Models A, B, C, 1½", (13).
- Cleveland Model C, 2" (2).
- Nos. 24 and 34 New Britain Chuckers.
- New Britain 6 spin., 1" cap. M.D., cutoff (2)
- Brown & Sharpe, OO, OOG.

Drills

- 2 spidle. Henry & Wright, No. 3 M.T., P.F.
- 2, 3, 4 spdl. H & W., Allen, Lel. G., Avey (33)
- 3½" Western, radial m.d. & m.
- 3, 4 & 6 spdl. All. Hi-Sp., P.F., Tap. At., l.t.
- 4 spin. No. 2 Colburns, No. 3 M.T. (2)
- 4 spdl. Cincin. Bick., dir., motor dr.
- Moline Hole Hog, various sizes (5).
- Fox Mult. spdl. with Tapp. att. (4).
- Pratt & Whitney double end, m.d. & m.
- No. 121 Baker Heavy Duty, 2-spdl.

Gear Equipment

- No. 5A Lees-Bradner Gear Hobbers (3)
- No. 36 S.T. G. & E., Auto., 4 s. Gr. R., m.d.

Grinders

- No. 34 Van Norman Internal.
- No. 70 Heald Inter., m.d. (3).
- No. 80 Heald Internal

54" Ingersoll Rotary, 3-head, m.d.

Type A, 46"x8" Gooley & Edlund Prod. Mill.
56" Newton Rotary, m.d.

Planers

36"x60"x14" American, widened to 60".

Presses

- 10, 25, 50 ton Henry & Wright with dbl. r.l. fds.
- No. 2½ V & O, OBI Dial feed, M.D.
- No. 3½ Toledo, O.B.I., m.d. & m.
- No. 4 Lashbough Jordan
- No. 5A Toledo, O.B.I., flywheel type.
- No. 6-I Cleve. O.B.I., G.M.D., (4). No. HG Cleve., (3). Eqiv. No. 6—O.B.I.
- No. 5 Canco, 8" str., S.S., bk. grd., m.d. & m.
- No. 52 Toledo Arch, 29x29 bolster.
- Nos. 56 Toledo S.S., sale cr.
- No. 62 Bliss, S.S., S.C.
- No. 62 Toledo, S.S., Bk., Grd., m.d.
- No. 63 Michigan, S.S.
- No. 79B Stoll Dble. Cr., 7" str.
- No. 24 Toledo, cam. draw., m.d. & m.
- No. 4A Bliss swinging adj. table, m.d. & m.
- P-2, P-3, P-4 Ferra, solid back, q.m.d. (12); DG-53 Fer. S.S., S.C., B.G., G.M.D.
- No. 203A Toledo, dble. cr., m.d. & m.
- No. 203B Toledo ble. cr., m.d. & m.
- No. 204 Sp. Toledo dble. cr., m.d. & m.

SPECIAL

No. 55½ Toledo St. Side, Tie Rod Press, q.m.d. & m., double roll feeds, 88 ton pressure

- Arier No. 132 Drum Type, m.d. (2).
- Norton Model B Tur. type, m.d. (2).
- No. 126 Gardner db. spdl. op. m.d., hyd.f.d.
- 53" Besley Vert. Disc, m.d. & m.
- Nos. 6, 12A & 20 Bryant (12).
- 12" and 16" x 36" Cinc. Pl. Cyl. (2).
- 20" Badger Face, hyd. feeds, table travel 44"
- No. 3 Landis Universal Grinder.
- 16"x42" Landis Crank M.D. like new.

Lathes

- Fay Automatics, 14" standard (7).
- Gisholt Simplimetics, m.d. (2).
- 3x36 J & L Flat Turret, s.p.d.
- No. 4 AC LeBlonde Crank Shaft M.D.
- 21" & 24" Gisholt Univ. Turret.
- 18"x7" Amer. Grd. Hd.
- 14"x5" American.
- Potter & Johns. Auto., Nos. 5A, 6A, 7A m.d.(12)
- 16"x6" Monarch Geared Head Lathe.
- No. 9 Bardons & Oliver Turret.
- No. 2, 4, 6 Warner & Swasey Turret (8).

Mills

- Model B Becker Vertical, with rotary table
- No. 3 Kent Owens, Power feed, m.d.&m.
- No. 3A Davis Thompson dble. end., 4-spin.
- Nos. 1, 2 & 3 Craftsman Rot. Prod.
- No. 1 Kempsmith Univ.
- No. 4 Cincinnati Plain Mill.
- 28" Cincinnati Semi Auto., sq. & dup. hds.
- No. 21 Brown & Sh., Prod. s.p.d.

Bliss Consolidated No. 3, 4, 5, m.d.

Shapers

- 16" American Hy. Duty, s.p.d.
- 16" American Hydraulic
- 24" Cincinnati, b.g.

Shears

- 10" ¾" Pexto Gap Frame Lathe Type, m.d.&m.
- 10", 16 ga. Sterene Shear.

Upsetters

- 1" National, Steel Bed.
- 1½" Acme, steel bed, m.d.

Welders

- Federal, 125 KVA, M.D.
- 200 KW Federal Projection Spot.
- 150 KVA Thompson Butt Welder.
- Spot, Taylor Winfield Automatic, 20-27 KVA (6), motor driven, late type.
- Taylor Winfield, National, Federal m.d. Butt (12)
- Taylor Winfield 4 way Flash Welder m.d.
- Taylor Winfield, Federal Thomson Spot (34).
- Taylor Winfield Gun Type, Portable.

Miscellaneous

- Balancer, 18" Gisholt Static, Vert.
- Bolcut., 2 sp., ¾" cap., Landis, ld. scr. att.
- Broach, No. 4 Lapointe.
- Broach, V-18 American.
- Chip Separator, McKenzie, M.D.
- Core Blower, No. 6 Demmier (3).
- Die Sinker, No. 2 Pratt & Whitney

AND A COMPLETE STOCK OF FINE UP-TO-DATE EQUIPMENT

HARVEY GOLDMAN AND CO.
 10571 GRATIOT AVE. DETROIT, MICH.

Automatics, No. 2 Brown & Sharpe,
High Speed, (6).
Band Saw, No. 8 Marvel, motor drive.
Brakes, hand, 8' 18 ga., 8' 14 ga., (2).
Drill Presses, 4 sp. Leland-Gifford &
Aveymatic, H. S.
Grinders, surface, No. 2 LaSalle; No. 2
Wilmarth & Moran.
Hobbers, No. 12 Barber-Col.
Lathes, 18x6 Monarch gd. hd., m.d., (2).
Lathes, 24"x12' Advance.
Millers, No. 2 Reed Prentice vert., B.
B., M. D.
Punch Presses, Nos. 1 to 5 O. B. I.;
several straight sided.
Radial, 3' Morris, S. P. D.
4' Ryerson, S. P. D.
Shaper, 24" Stockbridge, M. D.
Slitter, No. 235A Bliss, 36", S. P. D.
Slotter, 3½" Rhodes.
Turret Lathes, No. 2A W. & S., com-
plete with bar equip., M. D.
300 High Grade Tools In Stock.

VICTOR Machinery Co.
130-132 South Clinton St., Chicago, Ill.

E55LEY Machine Tools

PRACTICALLY NEW

24" swing x12' bed Lodge &
Shipley Geared Head Double
Drive Crankshaft Lathe.

While designed for crankshaft
turning, it can be converted to
heavy duty production turn-
ing.

Has multiple stops on cross
and longitudinal feeds for
shoulder work.

*Specifications and details will
be sent on application.*

THE E.L.E55LEY MACHINERY CO
831 W EVERGREEN AVE - CHICAGO, ILL

UNUSUAL Hard-to-find Machines Immediate Delivery

Shuster Wire Straighteners and Cutters, 20' and 24' bed
Pratt & Whitney No. 5 Die Sinker
Hendey Geared Head Lathe 24"x10'
Hendey Yoke Head Lathe 24"x16"—(Tie Bar)
Lodge & Shipley Geared Head Lathe 20"x10"—12 Speeds
Waterbury Header No. 3½ DDS
Cincinnati Bickford Radial 6' Arm Enclosed Head
Heald No. 70 Internal Grinder

AND MANY OTHERS



**Machinery and
Supplies, Inc.**
653 Frelinghuysen Ave.,
NEWARK, N. J.

WANTED

Sales Agencies for
New Equipment
5 Salesmen
Largest Machinery Salesrooms
in New Jersey
142' frontage on
busiest thoroughfare

GOOD USED MACHINERY

RADIAL DRILLS

All have single pulley or motor drive and tapping attachment unless so noted.
 3' Dreses
 3' Cincinnati Bickford
 3 1/2' Western
 3 1/2' Morris
 4' Western
 4' Almond elbow arm sensit.
 5' Western
 6' Niles Bement Pond
 6' Western
 No. 3 Barnes horizontal

FURNACES

Stewart special triple comb.
 No. 420 Std. Fuel Engin. Co.
 No. 0 Stewart crucible
 Brown Contin. record. pyrom.
 21" x 32" x 21" Surf. Comb. Co.
 45" x 46" x 45" heat. for f. wks.
 No. 515 Std. Fuel Engin. Co.

GEAR CUTTERS

5" x 7" No. 3 Barber Colman
 12" x 10" No. 12 Bar. Col. hob.
 12" x 13" No. 12HS G. & Eber.
 18" x 30" No. 18H G. & Eber.
 24" x 10" No. 24H G. & Eber.
 28" Gould & Eberhardt
 36" x 6" Gould & Eberhardt
 6" - 10" No. 1 Lees Bradner
 14" No. 5AC Lees Bradner
 14" x 8" No. 5A Lees Bradner
 No. 75 Fellows gear shaper
 No. 4M Fellows measure
 48" No. 4 Brown & Sharpe
 15" Gleason gr. quench. pr.
 Gleason circular finish. cut.
 No. 2 Bilton Auto gear miller
 Nat. Tool Co. (Clev.) Mod. B
 Gleason bevel gear tester
 Lipe 2-spindle chamberer

ENGINE LATHES

10" x 5" Pratt & Whitney
 12" x 6" Monarch
 13" x 6" Willard
 14" x 8" Lodge & Shipley
 16" x 6" Monarch
 16" x 6" Cincinnati
 16" x 6" Hendey
 16" x 8" Reed Prentice Grd. hd.
 16" x 9" Lehmann
 16" x 10" LeBlond
 17" x 8" LeBlond
 18" x 18" L. & S. geared head
 18" x 9" Chard
 21" x 18" Leblond
 22" x 10" Davis
 22" x 12" Morris geared head
 23" x 10" Rahn Larmon
 24" x 10" LeBlond
 24" x 10" Boye & Emmes
 24" x 10" L. & S. geared head
 24" x 12" Lodge & Shipley
 24" x 16" Boye & Emmes
 26" x 10" Wickes
 26" x 12" Wickes
 26" x 15" American geared hd.
 30" x 12" Lodge & Shipley

TURRET LATHES

No. 2 Warner & Swasey
 No. 4 Cincinnati Acme
 Nos. 3 & 5 Foster
 21" Gisholt
 24" Steinle
 3" x 36" Jones & Lamson
 4" x 34" Jones & Lamson
 Jones & Lamson 2 spindle
 No. 4 Bardons & Oliver
 2 1/4" x 26" Greenlee
 2 1/2" x 26" Pratt & Whitney

MILLS. BORING

40" Bullard
 42" Bullard, MD, PRT
 42" Detrick & Harv. MD, PRT
 3" Binsee horizontal
 5" Barrett cylinder Boring

MILLERS

Nos. 5C & 6 Becker vertical
 No. 2 1/2 Rockford
 No. 4 LeBlond ..
 No. 6 National Transit
 6" x 14" Pratt & Whitney thrd.
 24" Cincinnati duplex
 48" Cincinnati automatic
 No. 3 Rockford Rigidmill
 No. 31 DeVlieg Supermill
 No. 21 Brown & Sharpe auto.
 36", 42", 48" & 72" Inger. cont. rot.
 Model C Becker rotary
 48" Ohio tilted offset
 28", 37" & 42" Briggs
 Nos. 1 & 1A Davis & Thomp.
 Type 45 Bilton Productomatic
 No. 33 Kempsmith production
 No. 3-24 Cincinnati hydroma.
 No. 2 Bilton gear
 Kent Owens (Toledo)
 2M Potter & Johnston

PREESES

750 ton Baldwin Southwark triple act. hyd. toggle draw.
 14 1/2" bet. uprs. 84" shut height, 550,000 lbs.
 600 ton No. 664B Toledo coing.
 40" between uprights
 150 ton No. 661 Tol. coin. 3" str.
 100 ton French Oil Mch'y. Co.,
 hyd. press for shrtnq. casts.
 108" No. 7961/4D Toledo Double Crank Toggle Drawing
 No. 11/2 Bliss Toggle Drawing
 No. 164 (173) Tol. Tog. Draw.
 No. DDG54 Ferr. cam draw.
 48" No. 6A Bliss double crk.
 Tie rod frame, roll feed
 45" No. 151 Ferr. Dble. Crank
 28" No. 71 Swaine dble. crk.
 gap frame
 No. 21 1/2 Bliss Consd. O.B.I.
 No. 5-I Cleveland O.B.I.
 Waterb. F. O.B. 4 1/2" shaft
 No. 6 Bliss Consolidated O.B.I.
 No. 6 Toledo O.B.I.
 Nos. 75&76 grd. Toledo, O.B..
 non-incl.
 Waterb. F. O.B. non-incl.
 Frem. O.B. non-incl., 2 1/2" str.

No. P2 Ferracute

No. EG35 Erie punching
 No. 94 Bliss Consd. Punch.
 Nos. 55, 55 1/2, and 56 Tol. str.
 No. 55 1/2 Toledo straight side
 with side shear
 No. 65 Consd., straight side
 No. 7 Rockford, straight side
 No. 8-7 ZEH & Hn., str. side
 No. 74 1/2 Bliss, straight side
 No. 4 Massillon, str. side, grd.

THREADERS (BOLT CUTTERS)

1 1/2" Landis double spindle
 1/2" Acme 2-spindle
 1/2" Webster & Perks 2-spdl.
 3/4" Geometric
 1" Landis
 1" Landis 2-spindle
 1 1/2" Geometric with 1" Murc.
 chey die hd.
 1 1/2" Landis 2-spdl., ld. scrw.
 2" Landis
 2" Landis 2-spindle, ld. screw
 2" Acme
 2 1/2" Landis with or without
 lead screws
 3" Acme class A. lead screw
 13" x 6" Auto. thrd. lathes

WELDERS

12 KVA AEF type LD8, 11" rch.
 12 KVA AEF type BW16 14" r.
 15 KVA Nat. type 2SF012 spot
 17 KVA Thomson Gibb, type
 D18-17 spot
 18 KVA American Elect. Fus.
 20 KVA Agnew type 10D spot,
 15" reach
 20 KVA Agnew No. 10D spot,
 16" reach
 20 KVA Taylor spot, 14" rch.
 20 KW Federal No. 124 Jr. sp.
 20 KW Tol. No. 140 sp. 26" r.
 20 KW Tay. Mo. port. q. type
 23 KVA Winfield sp., 21" rch.
 50 KVA Detroit spot, 18" rch,
 motor drive
 100 KVA Thom. G. M24-100
 25 KW Winfield butt
 35 KW Fed. No. 60, au. upset
 65 KW Federal type 10A butt
 75 KVA Federal No. 61 Butt
 150 KVA Am. Elec. FusionCo.

MISCELLANEOUS

Accum., Elmes, 8" x 10" tank t.
 Balancing Mach., 44" Norton
 Barrel. No. 32 Globe tilt. tum.
 Barrel, Paxson tilting, tum.
 Boiler. 53" x 8" Scotch marine
 Brake. 10' x 3' / 18' No. 205 Chq.
 Car Washer. Curtis hydraul.
 Car Pull. 5000-lb. Md. Morris
 Centerer. 3 1/4" Hans. Whit. r.
 Centerer. 4" Whiton 2-spdl.
 Centerer. No. 0 Garvin dbl. e.
 Centerer. No. 1S Garv. db. e.
 Centerer. Dbl. end, Garv. 00S
 Centerer. Barnes double end.
 12" swing

PARTIAL LIST ONLY. SEND US YOUR INQUIRIES

MILES MACHINERY CO., SAGINAW, MICH.

AUTOMATICS

5A & 6A Potter & J., m. d.
14x19 & 14x31 Fays, M. D.

HOBBERS & GENER'S.

6" & 11" Gleason bevel gear.
No. 12 Barber-C., R. T., (6).

GRINDERS

No. 2 LaSalle, No. 2 Bath.
No. 3 Cin. 12x48, cyl.
Nos. 4, 6, 7 Gardner and
Badger, Disc.

LATHES

9x20 Porter-Cable Prod.
16x6 American, Tap. Att.
18x8 Sch.-Boye-Emm., Q.C.G.
24x12 Advance, Q. C. G.
24x10 & 14 Lodge & Shipley.

MILLING MACHINES

Hendy Lincoln type.
No. 20 Garvin Vertical.
No. 4 B. & S. & Cinci. plain.

SHAPERS

12" & 16" G. & E. & L. & D.
24" Walcott, 28" Amer. B. G.

SCREW MACHINES

1½x7 New Brit.
No. 2 B.&O. & W-Swasey.
3-21" Gisholt turret lathes.
½" Model G. Gridley auto.
MISCELLANEOUS
Boring Mill, 51" Bullard 2 Hds.
3" Horizontal, floor type.
Brake, 8" D. & K., 10 gm. cap.
Radial Drill, 3" Bickford.
Shear, 10" Niagara, 10 gm. cap.
Punch Presses, all sizes.
No. 6 Wells wire st. & cut.

PARTIAL LIST. SEND US YOUR INQUIRIES.

Segal Machinery Co., 117 S. Clinton St., Chicago, Ill.

— PARTIAL LIST —

42" Colburn boring mill, cone drive.
12x52" Landis plain Grinders.
2½" Greenlee Flat turret, cone.
No. 11, 12 and No. 13 Natco Drills.
Avey 4 spindle, B.B.
Avey 6 spindle, B.B.
Single spindle Leland Gifford, B.B.
No. 1B Edlund two spindle, B.B.

No. 3 L. & A Gd. Shear, 18" gap, ¼" Cap. 52" long
16" x 48" Landis Crankshaft grinders.
20" Kelly Shaper, B.G. Cone.
10" Robinson Toggle press brake.
3 Spindle Leland Gifford with tapping heads.
3 Spindle Kern. B.B., with tapping heads.
30" x 30" x 6' Gray planer, 1 head.
24" x 24" x 6' Cincinnati planer, 1 head.

IROQUOIS MACHINERY CO., 660 Ohio St., Buffalo, N. Y.

Segal
WOODSTOCK
TYPEWRITERS

THESE AND MANY MORE

2½" Landis Bolt Threader, Lead Screw, C/S Belt Drive.
 4" Acme Bolt Threader with 3½" Landis Head C/S, Belt Drive.
 No. 9½ Merrell Pipe Machine, Cap. 2½" to 8", A.C. Motor.
 10"x30" Webster & Perks, 6"x32" Norton,—12"x24".
 Modern—12"x48" Cincinnati Cylindrical Grinders.
 13"x6" Willard Q.C. Lathe.
 18"x6" and 18"x8" American Lathes G.C.
 20"x8" Whitcomb-Blaisdell, Geared Head.
 24"x12" New Haven Q.C. Chuck.
 2-18"x12" Springfield
 20"x13" Lodge & Davis, Blocked to 37½".
 24"x12" Bradford
 3-26"x12" Reed's
 42"x20" Lodge & Davis, Blocked to 52".
 No. 1½ Rockford Pl. Milling Machine.
 2-Pratt & Whitney Mfg. Millers—15" Travel.
 4-24"x6" Gray and Ohio Planers,—30"x10' D & H Open Side.
 1-Hd.—36"x8" Gleason 2-Hds.
 50-75-200 lb. Hammers.
 175-A Consolidated press, No. 21 Bliss Press. and Others.
 Shapers.
 30" Colburn Ver. Boring Mill, (Old Style) 1-Hd
 8"x10-Ga. D & K Pan and Box Brake—8" Fingers.
 3-Drill Grinders.
 6x6, 9x9, and 13x16" Peerless Saws.

LARGE STOCK OF GOOD MACHINE TOOLS

THE NORTON-BROADWAY MACHINERY CO.

610 Baymiller Street,

Cherry 5208

CINCINNATI, OHIO

HIGH GRADE MACHINE TOOLS

No. 0G BROWN & SHARPE AUTOMATIC SCREW MACHINES

No. 2 BROWN & SHARPE HAND SCREW MACHINES

No. 7 FELLOWS HIGH SPEED GEAR SHAPERS

No. 71 FELLOWS HIGH SPEED GEAR SHAPERS

72" GOULD & EBERHARDT AUTOMATIC GEAR CUTTER

14" x 5' HENDEY ENGINE LATHE—YOKE HEAD-
STOCK Taper attachment, Draw-in attachment,
with collets

34"x34"x14' INGERSOLL MILL—Adjustable rail

No. 2A GARVIN UNIVERSAL MILL—Cone drive
HAMILTON ROLLER DIE FORMER

HUNDREDS OF OTHER MACHINE TOOLS IN STOCK.

Indianapolis Machinery & Supply Co., Inc.
1959 SOUTH MERIDIAN STREET, INDIANAPOLIS, INDIANA

GOOD MACHINES

Bliss No. 3½ S.S. D.C. Press 3" stroke.
M.D. with A.C. Motor

Boring Mills: Bullard Rapid Production,
36" cap. Turret and side head.

Milling Machines: 28" Cin. Duplex, semi-automatic, No. 12 Pratt & Whitney Profiler, Cin. No. 2 Univ., Kemps. No. 1 Univ., Rockf. No. 1½ Univ.

Lathes: Hendey q.c.g. 16"x10' Tap. Att., Lodge & Shipley, 18x8, pan bed, T.A., Q.C.G.

Brakes: Chicago Steel Power Apron 8' ½ cap., M.D. 9' 10 ga. B.D. Press Brake 5' 14 ga. M.D.

Roll: 6'x1¼" cap. power forming, drop end M.D. with motor, 8½" Initial type, Power Forming, drop end, M.D.

Shears: No. 208A Nia. Shear & Flanger 8 ga. cap. M.D. with motor, Pels Combination. M.D.; Pels Bar Shear

ACME EQUIPMENT CO.
128 S. Clinton St., Chicago, Ill.

LARGE and VARIED STOCK *High Grade* Machine Tools USED and REBUILT

BORING MILLS—Horiz. & Vert.

PLANERS

LATHES

TURRET LATHES

**GRINDERS—Universal, Plain,
Internal, Rotary**

GEAR HOBBERS—

GEAR CUTTERS—

RADIAL DRILLS—

and all other types of machine tools

Send your inquiry to:

MOREY MACHINERY CO., Inc.
410 Broome Street, New York City

READY FOR USE

MILLS

No. 1½ Valley City Univ.
No. 2 Kempsmith Univ., Vert. Head.
No. 3 Cincinnati Univ. (Knuckle)
No. 2 Heavy Brown & Sharpe Plain.
No. 3 and No. 4 Cincinnati Plain (Knuckle)
18"-24" Cincinnati Automatic & Duplex
(10) Hand Mills, All Types

MISCELLANEOUS

16"-18"-24" G & E Shapers, Motor Drive
18" x 8' Hendey-Hamilton Lathes, Taper.
6x6"-9x9" Peerless Shaping Saws, M. Dr.
6x6" Racine Shear-Cut Saw
No. 6 & 36" Fellows Gear Shapers
No. 12 Barber-Colmans, Long Beds, Rapid
Traverse

(5) Surface Grinders, Abrasive-Covel, M.D.

(6) Warner & Swasey Turret Lathes, 14".

4 x 60"-72"-84" Lo Swings, 2 Carriages.

No. 308—6" Espen-Lucas Hydraulic Cold
Saw, Motor Drive

2" Buffalo Armor Plate Bar Shear, M. Dr.

10' x 10 Ga. Geo. Ohi Press Brake, M. Dr.

10' x 16 Ga. Kutschied Sq. Shear, Gauges,
Motor Drive

No. 25½ Foote Burt H.D. Prod. Drill, No. 6
M.T., M. Dr.

No. 452 New Britain 4 Spindle Chuckers,
Motor Drive

18"-30"-36" Rotary Tables, Pow. or Hand
Feed

900 Ton Z & H Percussion Press, M. Dr.

R. A. VINE'S MACHINERY WAREHOUSE

654 WEST WILLIS AVENUE

2-2

DETROIT, MICHIGAN

Guaranteed

DRILLS

No. 16D 4 Spdl. Moline Hole Hog.
No. 13 Natco, 16 Spindles.
No. C-5 Natco, 10 spindles.
28⁹ Cin-Bick, Tap, Att., Gr. Box.
20⁹ Barnes all-grd. self-oiling.
16⁹ Superior, H. S., B. B.
1 & 25p. Demco, H.S.B.B.
1, 2 & 3 Sp. Allen, P. F. & T. A.
No. 16&2 Leland-C. b., tap Att.
6' Carlton Enclosed Head Rad.
M. D. thru gr. box.

GRINDERS

No. 70 Head Int., clutch in hd.
Cleveland Relief, M. D.
No. 1 Wil. & Mor. Univ. T & C.
No. 3 Ohio Univ. T. & C.
No. 78 W. & M. Auto. Surf. B.D.
No. 3 Wil. & Mor. auto., surf.
No. 7½ Gardner, 30⁹ Disc, B.B.
8⁹x18⁹ Cinc. Pl. Cyl., M. D.
No. 1 & 3 B&S Univ. Belt Drive.

LATHES

No. 7 Foster Tur., Fric. Hd.,
Pwr. Cut Off, Att. Chucking.

No. 1 Foster Hand Turret.

8⁹x18⁹ Porter Cable, collets.
24⁹x12⁹ Schum. Boye q. c. g.
20⁹x42⁹ Fay & Scott Ext. Gap.
20⁹x12⁹ Hendey Q. C. G., T. A.
15⁹x8⁹ Rock. Semi. Q.C.G., Col.
16⁹x7⁹ Oliver, Q. C. G.
16⁹x7⁹ Hendey Q. C. G., T. A.
14⁹x6⁹ Hendey Q. C. G.
½ & 1⁹ l'ards. Bench. Collets.

MILLING MACHINES

No. 28 Ohio Plain.
No. AB Becker Vert. Arr. M.D.
No. 2 B & S Plain & Univ.
Nos. 2 & 3 Kempsmith Plain.
No. 2 & 10 P & W Hand.
No. 1½ Garvin Universal.
No. 1½ Rockford Plain.
No. 1 B. & S. Plain, cone head.
6⁹x48⁹ Pratt & Whitney Thread.

PRESSES

No. 2 L & J.O.B.I. 17 Stroke.
No. 6 Fox "Superflex".
No. 1 Bliss Cam, Fly & Grd.
No. 4 Rockford, o. b. i., Grd.

SHAPERS

16⁹ Ohio B. G. Crank, S. P. D.
16⁹x24⁹ S&M B.G. Crank, M.D. gr. b.
20⁹ Steptoe b. g. crank.
24⁹ Stock. b. g. crank, M. D.
20⁹ G. & E., B. G. Crank.
20⁹ Hendey B. G. Crank.

MISCELLANEOUS

Bolt Cut., 1⁹ Landis Lead Scr.
Die Filer, No. 5 Thiel, m. d.
Gear Cut., No. 3-26⁹-B. & S.
Nibbler, No. 2 Campbell, M. D.
Pipe Thrd., 2½-8 Wms., m.d.
Punch & Shr., No. 55 H. & W.
Riv. Hmrs., Nos. 1AA, 1½B,
2A, H. D., 3A, 3A H. D.,
& 5A High Speed.
Riv. Spin., ¾ Linley, M. D.
Saws, 6x6 Peerless & Racine
Saw, 6x6 Peerless Hack, New.
Screw Mach., ¾ Mod. "G"
Grid, M. D., No. 1 B. & S Hand
Shr., 6⁹x14 ga. D. & K. eq. m.d.
Shear, 10⁹x14 ga. D&K Sq. m.d.
Tester, No. 2A Rock'l. Hmness.

George M. Bernstein & Co.

1250 SO. CLINTON STREET

CHICAGO, ILLINOIS

"READY TO SHIP"

GARVIN No. 2 and 3 Duplex Millers, countershaft.

GARVIN No. 15 Planer type Vertical Milling Machine, countershaft.

WARNER & SWASEY No. 1 and 2 Hand Screw Machines, countershaft.

REED PRENTICE Production Lathes, No. 00 and No. 1 single pulley drive, all equipped with Barker chucks.

FITCHBURG Low Swing Lathes, geared head, S. P. D. 5" x 5' centers.

PRATT & WHITNEY No. 13 Multiple Spindle Drill Press, rectangular head.

ALLEN high speed sensitive drills. 2, 3 and 4 spindle.

NATCO No. 14 Multiple Spdls. drill. 22 spdls. R. A. head 18 x 28" Table 22 x 30", S. P. drive, Serial No. 14,222.

CLEVELAND 2½" Auto. Model A.

GRIDLEY 1½" 4 spindle automatic, Model F. countershaft drive.

MAC DONALD Style 135 Can Press with strip feed. automatic oiling system, condition equal to new, Serial No. 32003, motor drive.

NIAGARA No. 7-B Geared Inclinable Power Press, 5" stroke.

BLISS No. 74-½ Geared S. S. Press, Tie bar.

BLISS No. 1-½ Geared, D. A. Press.

BLISS No. 21 Inclinable Presses, Roller clutch.

YATES-AMERICAN No. 30 Universal Saw Table, 3 phase motor drive, complete equipment.

Other just as desirable tools in our large stock. Send for catalog.

MORRIS MACHINERY COMPANY

97 Chestnut Street

Newark, N.J.

SELECT Inland TOOLS

MILLING MACHINE, No. 3B Brown & Sharpe, Plain, Double Over-arm, Timken Bearing, M-in-B.

LATHES, ENGINE, 30"x15" Schumacher Boye, Taper Att.; 14"x6' & 18"x16" Hendey, T. A.

LATHES, TURRET, No. 7 Foster, geared head, 2½" bar cap.; Pratt & Whitney, geared head, 2½" spdl.

PRESS BRAKE, 6' Cincinnati All Steel, ¼" capacity.

UNIVERSAL IRON WORKER, Ryerson, shearing, punching, angles, notching, coping.

SCREW MACHINES, AUTOMATICS, No. 0 & 00 Brown & Sharpe.

Inland Machinery Company
41 So Clinton St. Chicago, Ill.

* *

KEEP POSTED!

"THE BLUE BOOK" brings you copyrighted feature articles . . . a digest of important developments in the industry . . . latest offerings of the leading manufacturers . . . all the news while it is news on machines, methods and equipment.

* *

NEED GOOD TOOLS? — SEE US FIRST

D-31 FOX MULTIPLE DRILL, RECT. HEAD, 16"x31½" spindle centers. Bored for 36 spindles. Has ten 1¼ No. 2 Taper spindles. Power feed to head.

AUTOMATICS, Several Model A Clevelands, from ½" to 3¾" bar capacity.

BOLT CUTTER, 1¼" Acme single, class A; 2" Landis.

DIES and EQUIPMENT to make square cans, including Max Ans double seamer and squeezer and Adriance double seamer.

HORIZONTAL BORING MACHINE, 3-B Binsse 2½" bar.

DRILLS, 36" Cincinnati back geared, sliding head, tapping attachment; No. 2 Colburn Manufacturing; 36" Snyder, back geared; 24" Barnes All Geared Self Oiling B.D.; No. 4 Quint. Turret D.

HAND SCREW MACHINE, Wells ¾" capacity.

LATHES, Two 20"x10' Davis dbe., back gear quick change. 20"x8' Hamilton

dble. back gear semi-quick change. 36"x14' Fifield.

LATHES, 38"x14' Fifield — Cheap; 16"x8' Sidney, double back geared, quick change.

MILLERS, No. 3½ Pratt & Whitney duplex 60" table feed 27" between spindles. No. 1 Newton slab, 65" table feed.

MONITOR LATHE, 16' Dresses, universal, with chasing bar.

PLANERS, 36"x15' Betts, 2 heads; on rail.

PRESSES, No. 1 Bliss Cam Drawing Press,

SHAPER, 14" P. & Whitney.

TURRET LATHES, Two 21" Gisholt turret lathes, two 3"x36" Jones & Lamson and one 2"x24" Jones & Lamson.

Many other tools—exceptional "buys"—write for full details.

A. D. White Mchy. Co., 108 N. Jefferson St., Chicago, Ill.

Established 1894

TURRET LATHES

- No. 9 Bardon & Oliver, 2½" Capacity
 No. 9 Foster, 2 13/16" Capacity
 No. 6 Warner & Swasey
 1" x 6" Acme, Plain Head
 No. 1 Brown & Sharpe, Motor Driven

MILLERS

- No. 4A Brown & Sharpe (Heavy) Universal Miller, Vertical Attachment
 No. 20 Van Norman, Motor Driven
 No. 1 Kearney & Trecker Plain, Motor Drive in Base—Power Rapid Traverse
 No. 6 Whitney Hand Millers (10)

GRINDERS

- No. 72 Heald "Sizematic" Hydraul. Fds.
 No. 2 Brown & Sharpe Universal
 No. 33 Abrasive Vertical Spindle

PARTIAL LIST ONLY—SEND US YOUR INQUIRIES.**DALEY & SIBLEY**
MACHINERY DEALERS INCORPORATED**419 Chapel Street,****New Haven, Conn.****LATHES**

- 14"x6' Lodge & Shipley Grd. Hd.
 18"x8' Hendey-Cone Dr. Taper Att.
 12"x5' Hendey-Cone Dr. Taper Att.
 18"x13' Lehman Q.C.G. Fully Equipped
 16"x8' Bradford Q.C.G.-Cone Drive
 20"x10'; 18"x8' Loose Change Gear
 9" Sundstrand Stub Lathe

SCREW MACHINES

- 24" Milwaukee 4½" Hole In Spindle
 No. 2 Federal-Wire Fd. Cone Drive
 No. 3 Federal-Wire Fd. Cone Drive
 No. 0 B&S. Wire Fd. Semi-Auto.

DRILL PRESSES

- 1 to 6 Spindle-Allen, Leland Gifford, Avey
 Belt and Motor Drive
 17" Canned-Otto Sliding Hd. M. D.
 24" Prentice Sldg. Hd. B.G. P.F.
 26" Barnes Sldg. Hd. B.G. Power Feed

SHAPERS

- 28" Rockford Back Geared-Cone Drive
 24" Gould & Eberhardt B.G. C.D.
 24" American Back Geared Cone Drive
 20" Rockford-Single Pulley Drive
 20" Steptoe Back Geared Cone Drive
 16" Smith & Mills-Hel. Bull. & Pin.

SHAPERS

- 16" Hendey—Gear Box—Arr. M. D. (2)
 20" Hendey—Lima Motor Drive
 16"—20"—Gould & Eberhardt—C. Dr

LATHES

- 14"x6' Hendey—Taper—Draw-bar—
 Collets—Motor Drive

- 18"x10' Hendey—Taper—Motor Drive

PRESSES—LONG—STROKES

- No. 10 Bliss—Geared—10" stroke
 Nos. 1 & 2 Waterbury-Farrel—Geared
 10" strokes
 No. 41½A—Waterbury-Farrel—Dial—
 6" stroke
 No. 1 Bliss Toggle—Geared—3" 6" str
 No. 3 Rockford—Geared—4" stroke

MISCELLANEOUS

- Planer—36"x36"x10 Gray—Motor Drive
 Profiler—No. 12 Pratt & Whitney—Grd.
 Shear—3 1/16" x72" W. F. Fdry.—6" Gap

PLANERS**SAWS**

- 9"x9" Peerless High Speed Hack
 6"x6" Peerless High Speed Saw
 Nos. 1 and 2 Marvel Hack Saws

PUNCH PRESSES

- No. 93C Toledo S.S. Double Crank B. G.
 No. 91B Toledo Double Crank
 No. 156 Niagara—8" Stroke
 No. 84S Bliss Stiles Motor Drive
 No. 83 Consolidated Horning
 No. 5 American Can-B.G. 4" Stroke
 No. 3 Loshbough Jordan O.B.I.
 No. 2 Walsh O.B.I.—1 1/4" Stroke

GRINDERS

- No. 3 B. & S. Cutter Reamer—Motor Drive
 Nos. 1, 4, 6 Gardner Disc Grinders
 No. 2 Wilmarth & Marmon Surface Hand

MISCELLANEOUS

- No. 1 Campbell Nibbling—Motor Drive
 No. 2 High Speed Riveting Hammer
 2" Cap. Oster Pipe Threading
 42" Niagara Foot Shear—18" Gap
 48" Hendley Whittemore 14 Gage Roll
 No. 6 and No. 8 Whiting Punches

CLINTON MACHINERY CO.**35 S. CLINTON ST.****CENTRAL 3019****CHICAGO, ILL.**

QUICK DELIVERY! LOW COST!

The new Simmons Lathes feature the Micro-Speed Drive, an important fast-production asset. This Drive, contained in the cabinet leg, permits instant selection of an infinite variety of spindle speeds by the mere turn of a handwheel.

- Timken Precision Spindle Bearings
- Snap Levers for Apron Feeds.
- Added Efficiency Under Heavy Loads

Simmons Lathes are manufactured in 16", 18" and 20" standard, 16¹/25", 18¹/27", 22¹/34", 20¹/40", 26¹/40", and 28¹/50" gap beds in all bed lengths.



Complete Specifications upon Request. Write today.

SIMMONS MACHINE TOOL CORP.

1725 Broadway, Albany, N. Y.

Singer Bldg., New York City

Index To Advertisers

Aaron Machinery Co.	203	Bernstein & Co., Geo. M.	237
Ahart Gear & Machine Co.	172	Beverly Shear Co.	108
Abrasive Dressing Tool Co.	173	Black Diamond Saw & Mch. Works	132
Acme Equipment Company	236	Blaser Co., John	172
Acme Industrial Co.	175	Blank & Buxton Machinery Co.	6
Air-Way Pump & Equipment Co.	134	Bleser Machinery Co.	204
Alco Tool Company	149	Botwinik Brothers	228
Anderson Bros. Mfg. Co.	139	Bradley Machinery Co.	206
Armuglo Company	168	Bremil Mfg. Co.	168
Armstrong-Blum Mfg. Co.	Inside Front Cover	Breuer Electric Company	164
Armstrong, Bray & Co.	147	Bridgeport Machines, Inc.	69
Armstrong Bros. Tool Co.	4	Brooks Co., B. D.	204
Armstrong & Bro. Co., R. S.	206	Brown & Sharpe Mfg. Co.	47
Atlantic Mch'y. Corp.	215	Brown-Brockmeyer Co.	95
Atlas Press Co.	77	Brown Machinery Co.	220
Auto Moulding & Mfg. Co.	116	Bryant Chucking Machine Co.	75
Avey Drilling Machine Co.	15	Buffalo Forge Co.	12
Baldor Electric Co.	101	Burgess Battery Co.	169
Banner Manufacturing Co.	136	Burke Machine Tool Co.	128
Bansbach Machinery Corp.	210	Burr & Son, J. T.	118
Bates Marking Devices, H. O.	178	Canedy-Otto Mfg. Co.	8
Baumbach Mfg. Co., E. A.	138	Carboloy Co., Inc.	172
Beatty Mch. & Mfg. Co.	195	Carroll & Son, Wm.	170
Bennett-Raskin Machine Tool Corp.	221	Cerro de Pasco Copper Corp.	55
Berg & Co., C. F.	143	Chicago Die Casting Mfg. Co.	188
Berkely Equipment Co.	83	Chicago Pneumatic Tool Co.	35

Index To Advertisers, Con't.

Chicago Wheel & Mfg. Co.	122-123	Gaston Power Tools Co.	156
Cincinnati Machinery & Supply Co.	227	General Blower Co.	203
Cincinnati Tool Co.	149	Gits Brothers Mfg. Co.	153
Clinton Machinery Co.	239	Glenzer Co., J. C.	92
Colwell, Co., S. G.	115	Globe Machinery Co.	208
Cone Automatic Machine Co.	39	Goldman & Co., Harvey	231
Continental Machines, Inc.	81	Gorton Machine Co., Geo.	67 168
Conway Clutch Co.	73	Graham Mfg. Co.	156
Cullinan Sales Co.	190	Grant Mfg. & Machine Co.	185
Cullinan Wheel Co.	Back Cover	Greenerd Arbor Press Co.	108
Cushman Chuck Co.	48	Grobet File Corporation of Am.	159
Daley & Sibley Mchy. Dealers	239	Haleo Products Co.	132-152
Dalsen Tool & Mfg. Co.	131	Hamilton Tool Co., The	162-164
Daniels, C. R.	204	Hammard Machinery Builders	165
Danly Machine Specialties	180	Hanna Engineering Works	7
Davis Mchy. Co.	206	Hannifin Mfg. Co.	9
Dearborn Gage Co.	144	Hartdinge Brothers, Inc.	Front Cover - 3
Dearborn, J. W.	136	Hart Machine Co.	185
Delta Equipment Co.	212	Hartford Special Machinery Co.	150
Delta Manufacturing Co.	53	Harvey Mfg. Company	160
Desmond-Stephan Mfg. Co.	137	Hasco Machinery & Supplies, Inc.	232
Despatch Oven Co.	104	Heimann Mfg. Co.	146
Detroit Stamping Machine Co.	185	Hertzler & Zook Co.	135
DeWitt Tool Company	210	Hesner Manufacturing Co.	135
Dixie Mill Supply Co.	208	Hill-Clarke Machinery Co.	219
Dony Machinery Co., D. E.	204	Hilliard Corp.	194
Dreis & Krump Mfg. Co.	17	Hobart Brothers Co.	1
Dremel Manufacturing Co.	151	Hotel Auditorium	193
Drive-All Mfg. Co.	124	Hotel Essex	178
Duro Metal Products Co.	107	Hotel Lafayette	193
 		Hotel Metropole	131
 		Hotel Wolverine	130
 		Howell Clamp Company	142
 		Hyman & Sons, Joseph	204
Eastern Machinery Co.	216, 217	Illinois Testing Laboratories, Inc.	158
Economy Machine Products Co.	152	Indianapolis Machinery & Supply Co.	235
Kisler Engineering Co., Inc.	114	Inland Machinery Co.	238
Elgin Tool Works	78	International Mchy. Co.	230
Elyria Belting & Machinery Co.	205	Interstate Machinery Co.	222-223
Emerson, & Co., Louis E.	230	Iroquois Machinery Co.	234
Errington, & Co. Laboratory	175	 	
Esoco Eng. & Sales Co., Inc.	131	Jacobs Manufacturing Co.	43
Easley Machinery Co., E. L.	232	Jackson Machine & Tool Co.	192
Etco Tool Co.	71	Janette Manufacturing Co.	112
Excelsior Tool & Machine Co.	106	Jarvis Co., Chas. L.	65
 		Johnson & Sons Machinery Co., Wm. C.	173-206
 		Jones Machine Tool Co.	208
Factory & Mill Supply Co., Inc.	205	 	
Faillor-Strafer Machinery Co.	207	K-O Products Co.	184
Falk Mill Supply Co.	212	Kalamazoo Tank & Silo Co.	98
Fameco Machine Co.	180	Kearney & Trecker Corp.	33
Federal Press Co.	76	Klauber Machinery Co., E. L.	203
Federal Foundry Supply Co.	128	Knu-Vise, Inc.	189
Flynn Manufacturing Co.	142	Koebel Diamond Tool Co.	136
Fray Machine Tool Co.	110	 	
Fulfil Specialties Co.	87	 	
Galland-Henning Mfg. Co.	85	L-W Chuck Co.	121
Gallmeyer & Livingston Co.	60	L & J. Press Corp.	170
 		Lafayette Machinery Corp.	214
 		Lake Machinery Co.	208

Index To Advertisers, Con't.

Lang Machinery Co.	203	Prochnier Safety Chuck Co.	59
Laurens Bros.	224	Production Machine Co.	191
Lee Co., K. O.	142	Progressive Tool & Cutter Co.	189
Lima Electric Motor Co.	101	Putnam Tool Co.	58
Lincoln Electric Co.	27		
Linderme Machine & Tool Co.	158		
Lipe, W. C.	127		
Littell Machine Co., F. J.	203	Quality Hardware & Machine Corp.	34
Lowe Co., Chas. E.	113	Quality Tool & Die Co.	154
Luma Electric Equipment Co.			
McCabe & Sheeran Mchly. Co.	223	R & L Tools	10
McDonald Machinery Co.	213	Racine Tool & Mch. Co.	139
McKenna Metals Co.	179	Reeve-Fritts Co.	209
McMahon Co., Frank M.	126	Regar Mchly. & Mill Supply, S. M.	204-206
Machinery Manufacturing Co.	105	Reich Manufacturing Co., J. R.	127
Madison-Kipp Corp.	181	Reliance Machinery Sales Co.	204
Mall Tool Company	89	Remco Products Corp.	190
Manning, Maxwell & Moore	210	Rigid Tool Co.	90
Marr-Galbreath Machinery Co.	207	Ritterbush & Co.	211
Marshallton Mfg. Co.	113	Riverside Machinery Depot	209
Metal Carbides Corp.	189	Rivett Lathe & Grinder, Inc.	2
Michigan Chrome & Chemical Co.	174	Rosenkranz, Weisbecker & Co.	206
Midwest Tool & Eng. Co.	193	Ross Co., David J.	97
Miles Machinery Co.	233	Rotor Tool Co.	13
Milliken Machine Co.	199	Russell Boring Bar Co.	140
Modern Machine Corp.	150	Russell Machine Co.	207
Mohr Lino-Saw Co.	194	Ryerson & Son, Inc., Jos. T.	22
Moroy Machinery Co., Inc.	133-163-174-236		
Morris Machinery & Co., Inc.	237	S & S Machine Works	176
Moser Machine Tool Sales	230	Safety Socket Screw Corp.	129
Nelson Machinery Co.	204	Salem Tool Co.	146
New Britain Tool & Mfg Co.	152	Saroston Company	58
New Method Steel Stamps, Inc.	116	Schauer Machine Co.	197
Nicholson File Co.	29	Scherr Co., George	243
Nielsen, Inc.	193	Scott Machinery Sales	208-226
Nichols Tool & Die Co.	138	Segal Machinery Co.	234
Nilson Machine Co., A. H.	106-187	Seneca Falls Machine Co.	188
Norgren Co., C. A.	95	Severance Tool Mfg. Co.	163
Norton-Broadway Machinery Co.	235	Shaw-Box Crane & Hoist Division	140
Numberall Stamp & Tool Co.	150	Sheldon Machine Co.	173
O'Brien Machinery Co.	230	Siegman Machinery Co.	203
Oliver Instrument Co.	157	Simmons Machine Tool Corporation	226-240
Osborne & Sexton Machinery Co.	224	Smith Power Transmission Co.	19
Ott Machinery Sales, Inc.	210	South Bend Lathe Works	20
Owatonna Tool Co.	182	Stacklin Corporation	57-157
Patron Transmission Co.	208	Standard Machinery Co.	206
Peters Tool Co.	176	Standard Pressed Steel Co.	111
Pier Equipment Co.	103	Stanley Works	117
Plunket Machine Co., J. E.	177	Star Machine & Engineering Corp.	182
Postal Filing Mch. Co.	147	Steege Machinery Co., W. L.	178
Pratt & Whitney Co.	45	Strand Co., N. A.	171
Precision Tool Co.	161	Strong, Carlisle & Hammond Co.	228
Prints Electric Co.	148	Stuart Oil Company, D. A.	36
		Sturdimatic Tool Co.	155
		Sundstrand Machine Tool Co.	51
		Surplus Material & Mchly. Co.	203
		Sutton Tool Co.	126
		Tannewitz Works	118
		Taylor Machine Co.	162
		Toledo Timer Co.	146
		Torit Manufacturing Co.	167
		Toumkins-Johnson Co.	191
		Torq Electric Mfg. Co.	11

Index To Advertisers, Con't.

Trico Fuse Co.	176	Walls Sales Corporation	150
Triplex Machine Co.	214	Walton Co.	134
Troyke, Alfred A.	180	Wardwell Mfg. Co.	160
Turner Uni-Drive Co.	14	Wayne Chemical Products Co.	118
Universal Engineering Co.	166-183	Wells Manufacturing Co.	91
Universal High Speed Tool Co.	141	Western Tool Exchange	210
Used and Rebuilt Machinery	203-239	Western Tool & Mfg. Co.	159-162
Victor Machinery Co.	232	Westlief Tool & Die Co.	130
Victor Machinery Exchange	229	West Penn Machinery Co.	209
Viking Tool & Machine Corp.	102	White Dental Mfg. Co., S. S.	31
Vimco Mfg. Co.	154	White Machinery Co., A. D.	238
Vincent Steel Process Co.	170	Whitesides Machine Shop, W. M.	206
Vine, R. A.	236	Whitney Metal Tool Co.	143
Vonnegut Moulder Corporation	145	Wiemer Machinery Co.	204
Wade Instrument Co.	148	Wiggleworth Machinery Co.	209
Wade Tool Co.	156	Wilson, K. R.	16
Wall-Colmonoy Corp.	197	Wisconsin Gear & Eng. Co.	209-234
Zabors Mech. & Gear Co., J.		Wittick Manufacturing Co.	145
Zeeve, Alex.		Woodstock Typewriter Co.	220-234
Zeh & Hahnemann Co.		Wynenbeck & Staff, Inc.	18

GEORGE SCHERR CO. INC.

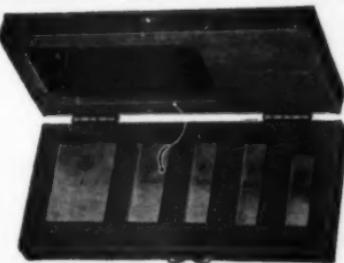
PRECISION TOOLS FOR GOOD MECHANICS

THESE TOOLS HAVE BEEN ESPECIALLY SELECTED FOR ACCURACY, PRECISION, WORKMANSHIP AND VALUE. ALL ARE NECESSITIES IN A GOOD MECHANIC'S TOOL BOX.



REED MICROMETER No. 701. Widely used by thousands in production work. Inexpensive, ACCURATE. Ask for REED folder.

REED MICROMETER DEPTH GAUGE for measuring holes, grooves, shoulders. Quick adjustment. Accuracy guaranteed. $2\frac{1}{2}$ " and 4" base.



The MECHANIC'S OWN Ultra-Chex Set. Accurate to 8 millionths. Five blocks $1\frac{1}{2}$ ", .500", .250", .125", .0625". Essential for toolmakers. Price \$12.50 complete in case. Order now!



REED TOOLMAKER'S MICROMETER with lock-nut, ratchet, 1/10000" vernier. Made in the U.S.A. over thirty years. Used in aircraft, tool and die and other metal working plants.

Write for folder on Reed Micrometers.

GEORGE SCHERR CO., Inc.
122 LAFAYETTE ST. NEW YORK, N. Y.

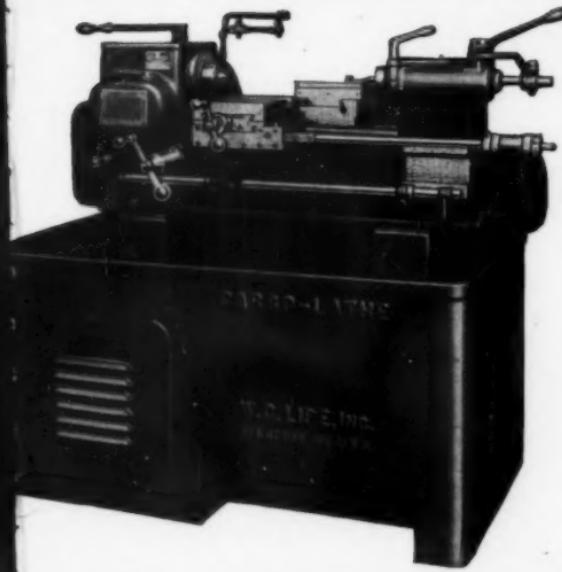
WATCH
for the
JANUARY ISSUE
of the
MACHINE TOOL
BLUE BOOK

Featuring unusually interesting and helpful editorial material—and a comprehensive buyers' index of machine tools, production equipment and supply sources.

It will be a noteworthy issue and one that will be preserved for frequent reference—an exceptional opportunity for effective presentation of your sales message.

HITCHCOCK PUBLISHING CO.,
508 So. Dearborn St., - **Chicago, Ill.**
(Phones HARRison 6040-1-2)

NOW ... SUPER RIGID FOR NEW SUPER-FAST CUTTING



LIPE

HIGH PRECISION

CARBO- LATHE

•
with
Non-Distortion
Box Base

CARBIDE tools, plus higher machine speeds!—that's the secret behind high armament productions. But the hard, tough alloys of modern armaments demand machine rigidity that conventional lathe designs do not provide. That's why this new-design Lipe Carbo-Lathe is super-rigid. Its new non-distortion trussed-box base permits heavy cuts through tough steels at high speed . . . to the closest accuracy. No out-of-round. No out-of-true. And with it all, less tool wear and breakage.

Lipe Carbo-Lathe boosts your production, of course; but what is more important, it actually gives you more profit on your increased volume. And it answers today's pressing question of "How can I up us production NOW—with no time for new buildings, and no time to train new men?" Write today for folder giving specifications and detailed description.

V. C. LIPE, Inc.
98 S. Geddes St., Syracuse, N. Y.

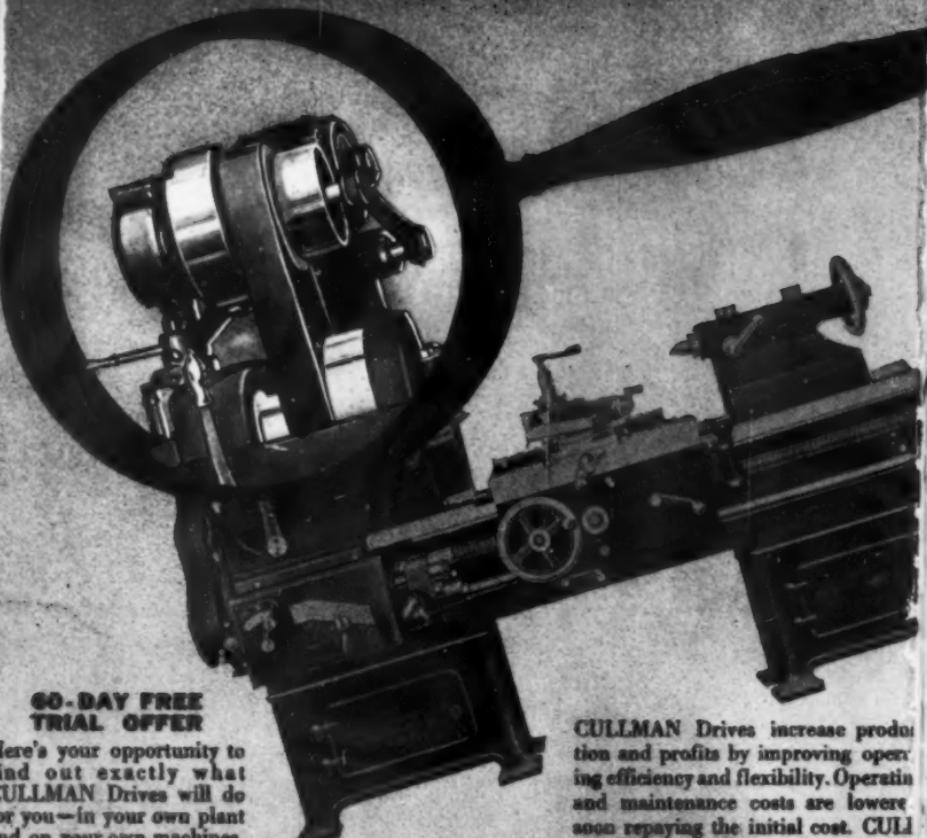
New Plant Space to Speed Deliveries

Demand for Lipe Carbo-Lathes and Lipe Carbo-Matic Lathes has reached such great proportions that a new factory building and new manufacturing facilities in the present lathe division are being put into operation to speed deliveries. Lipe Lathes are keeping step with American defense production.

CULLMAN

Machine Tool Drives

MAGNIFY Production and Profits— REDUCE Production Worries and Losses



60-DAY FREE TRIAL OFFER

Here's your opportunity to find out exactly what CULLMAN Drives will do for you—in your own plant and on your own machines. Just send us all the data on the machines to be equipped—we'll do the rest, without obligation on your part.

CULLMAN Drives increase production and profits by improving operating efficiency and flexibility. Operating and maintenance costs are lowered soon repaying the initial cost. CULLMAN Drives are easily installed. Available for your lathes, shapers, milling machines and other common pulley driven units.

THE CULLMAN WHEEL CO.

